

# TC-580

General Export Model



Set using ISO screws

## SPECIFICATIONS

**Power Requirements:** AC 100 V, 110 V, 120 V, 127 V, 220 V or 240 V  
50/60 Hz

**Power Consumption:** 90 W

**Track System:** 4-track stereophonic and monophonic

**Reel Size:** 7" (18 cm) maximum

**Tape Speed:** 7 1/2 ips, 3 3/4 ips, 1 7/8 ips  
(19 cm/s, 9.5 cm/s, 4.8 cm/s)

**Recording Time:**  
(with 1,800 ft. tape)

| Tape speed           | 4-track stereo | 4-track mono |
|----------------------|----------------|--------------|
| 7 1/2 ips (19 cm/s)  | 1.5 hrs        | 3 hrs        |
| 3 3/4 ips (9.5 cm/s) | 3 hrs          | 6 hrs        |

**Frequency Response:** (with SONY SLH tape)  
20~30,000 Hz at 7 1/2 ips (19 cm/s)  
20~20,000 Hz at 3 3/4 ips (9.5 cm/s)  
(with standard tape)  
20~25,000 Hz at 7 1/2 ips (19 cm/s)  
30~17,000 Hz at 3 3/4 ips (9.5 cm/s)  
30~9,000 Hz at 1 7/8 ips (4.8 cm/s)

**Signal-to-Noise Ratio:** 56 dB (with SLH tape)  
63 dB (with standard tape)

**Flutter and Wow:** 0.06 % at 7 1/2 ips (19 cm/s)  
0.10 % at 3 3/4 ips (9.5 cm/s)  
0.20 % at 1 7/8 ips (4.8 cm/s)

**Recording Bias Frequency:** Approx. 160 kHz

**Inputs:** Two MIC Inputs  
Impedance: low impedance  
Maximum sensitivity: 0.2 mV (-72 dB)  
Two AUX Inputs  
Impedance: 100 k $\Omega$   
Maximum sensitivity: 0.06 V (-22 dB)  
REC/PB connector  
Impedance: 10 k $\Omega$   
Input level: 17.4 mV (-33 dB)

**Outputs:** Two LINE Outputs  
Load impedance: 100 k $\Omega$   
Output level: 0.775 V (0 dB)  
HEADPHONE Output  
Load impedance: 8  $\Omega$   
Output level: 12.5 mV (-36 dB) at  
1 of level switch  
31 mV (-28 dB) at  
2 of level switch

**Overall Distortion:** 1.2 %

**Semiconductors:** 45 transistors, 1 integrated circuit, 27 diodes

**Dimensions:** 17 9/16" (W) x 8 7/8" (H) x 18 1/8" (D)  
(446 x 225 x 460 mm)

**Weight:** 43 lb (19.5 kg)

# SONY®

## SERVICE MANUAL

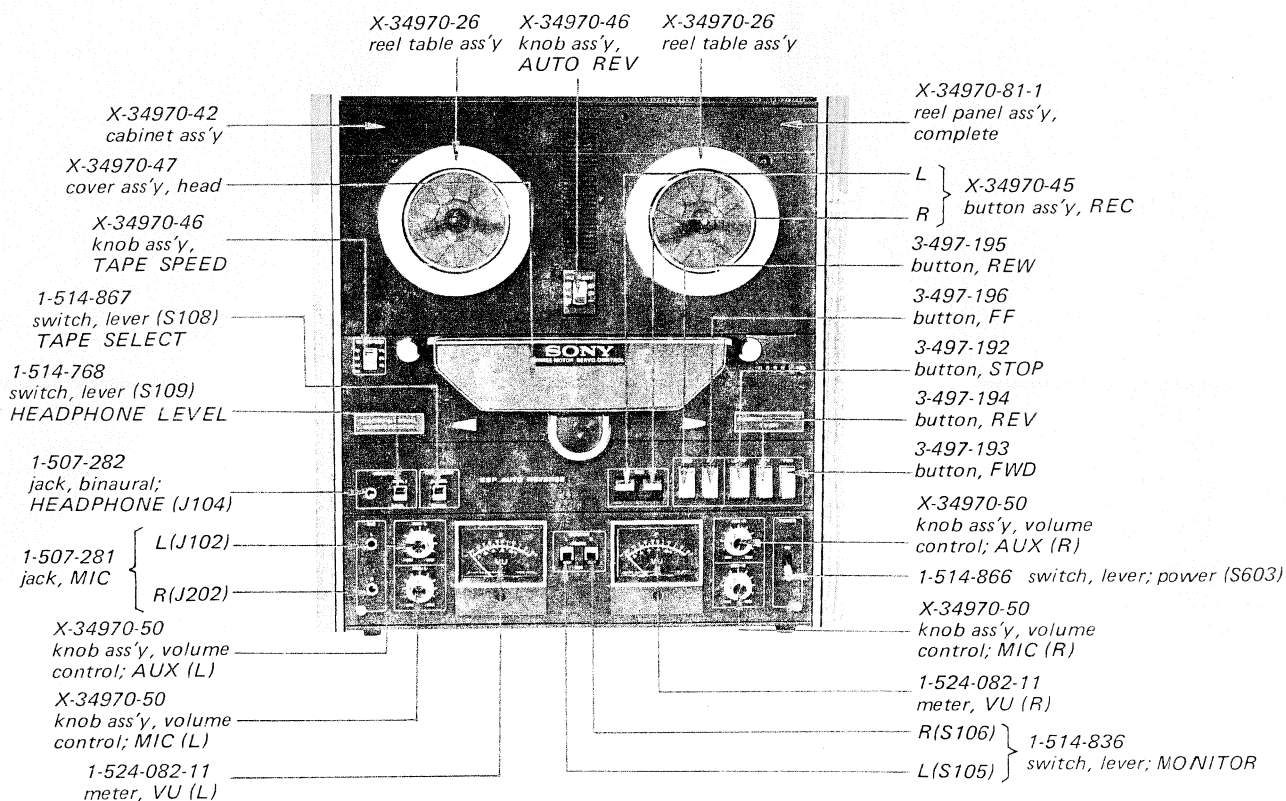
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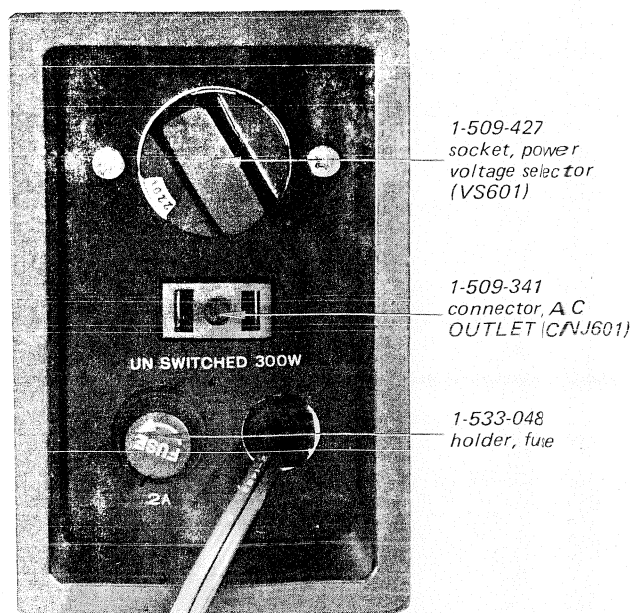
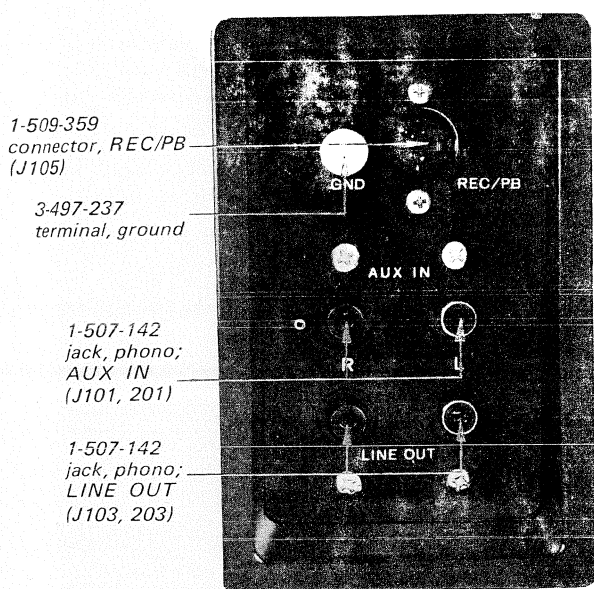


## 1-2. MAJOR PARTS LOCATIONS

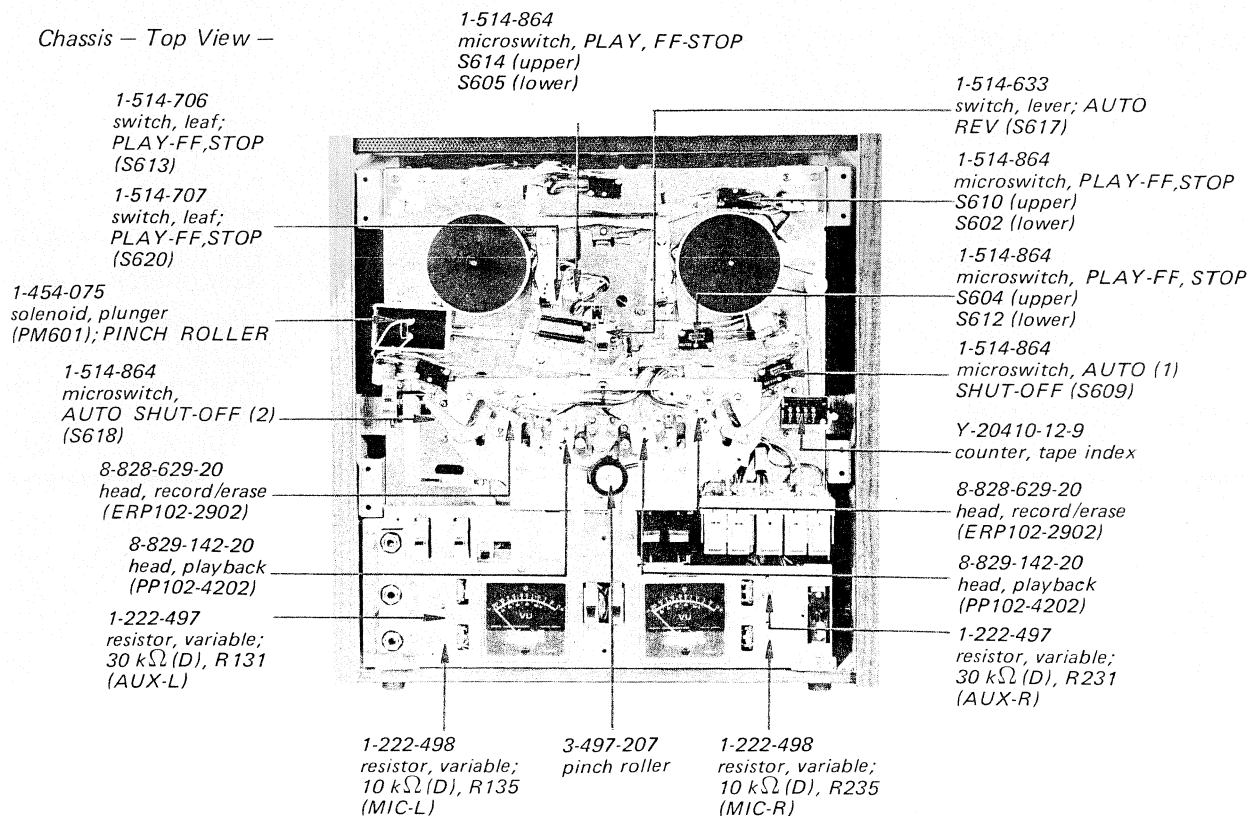
*Cabinet — Top View —*



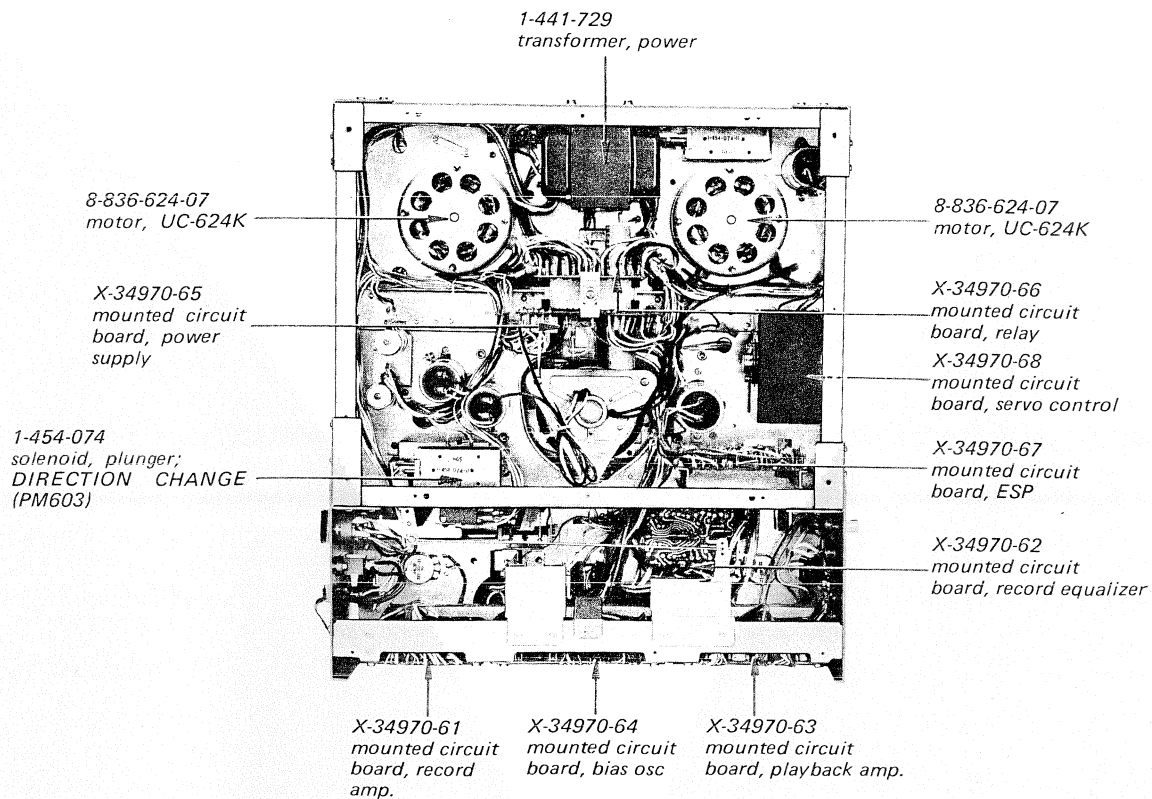
*Cabinet — Side Views —*



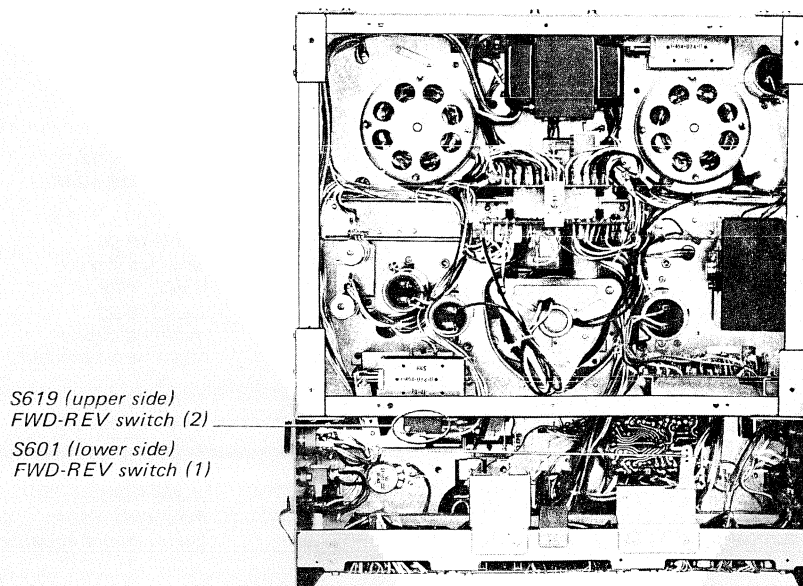
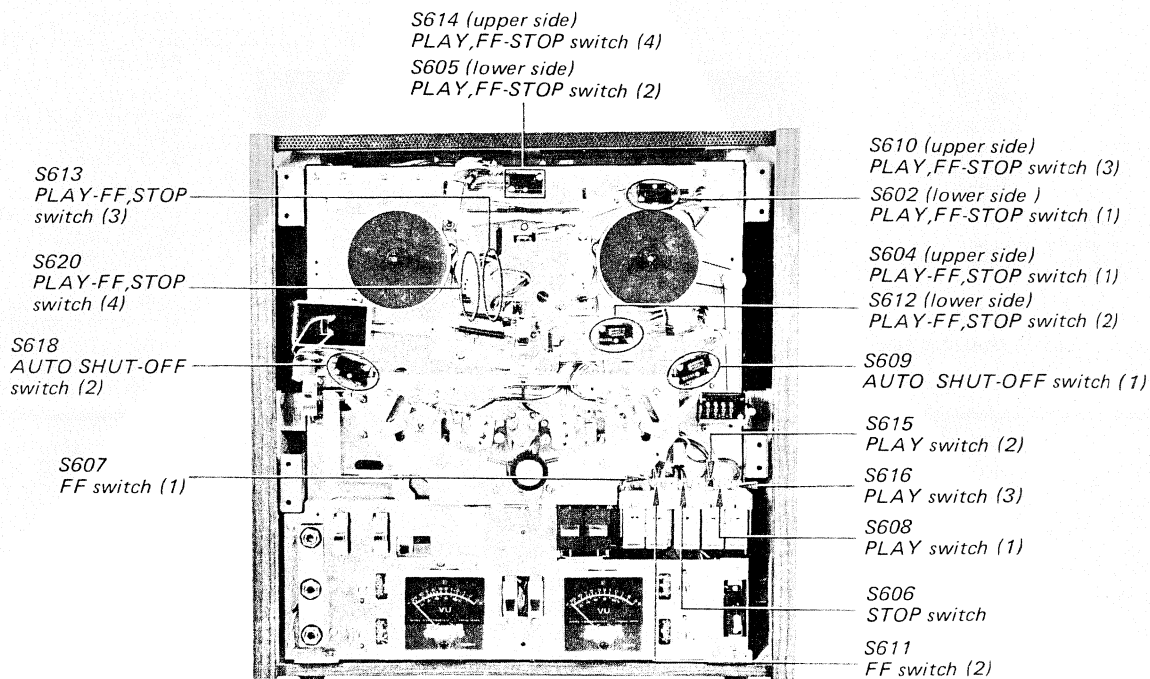
Chassis — Top View —



Chassis — Bottom View —



### 1-3. SWITCH LOCATION



## SECTION 2 DISASSEMBLY

### 2-1. Cabinet Removal

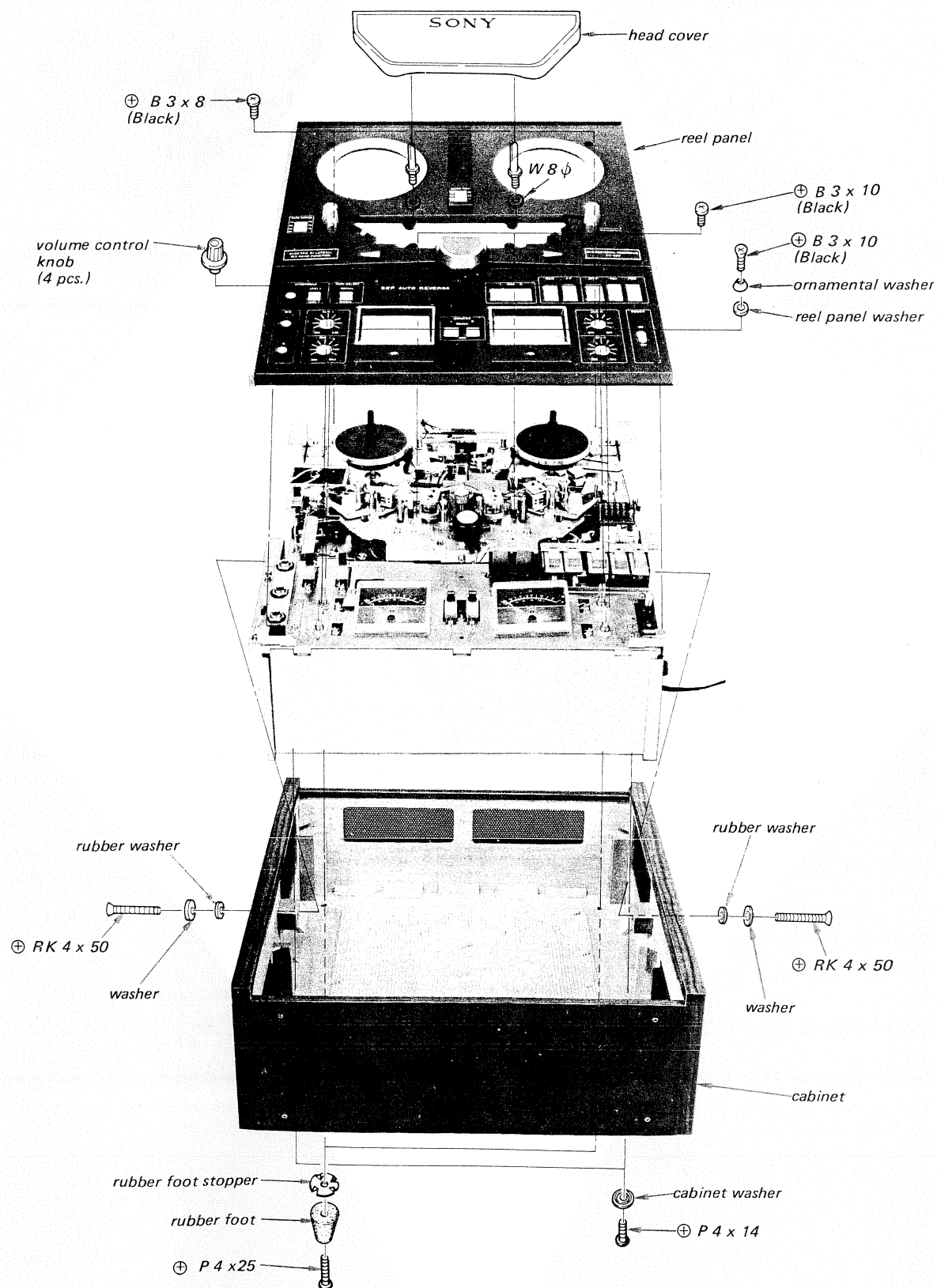


Fig. 2-1.

## 2-2. Head Deck Removal

1. Remove the FWD and REV lamps.
2. Remove the five screws shown in Fig. 2-2. Lift off the head deck.

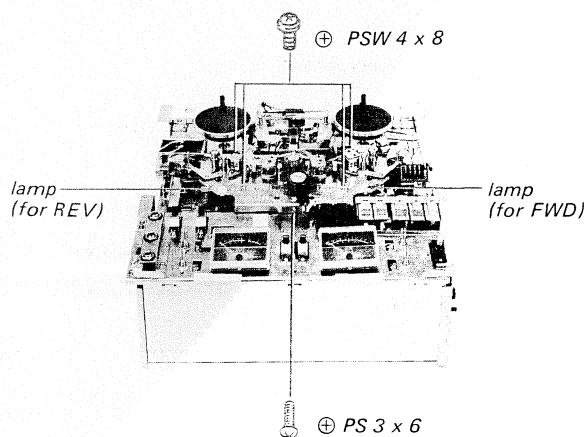


Fig. 2-2. Head deck removal

## 2-3. Record Equalizer Circuit Board Removal

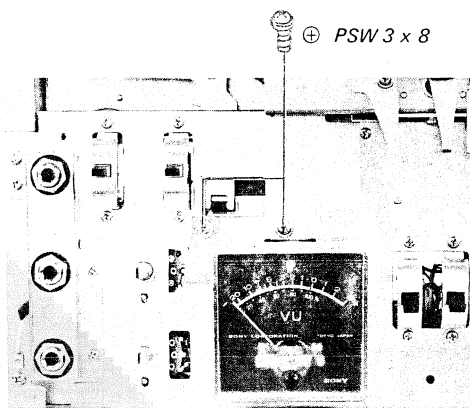


Fig. 2-3. Record equalizer circuit board removal

**Note:** After reattaching, make the equalizer switch (S107) position adjustment (See page 15).

## 2-4. Reverse Switch Circuit Board Removal

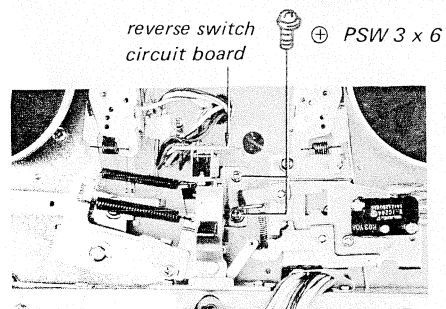


Fig. 2-4. Reverse switch circuit board removal

**Note:** Pay attention not to cut the head lead wires.

### CAUTION:

- 1) Install the playback and bias osc. circuit boards, after the levers are perfectly hooked to the holes of the slider of the slide switches.
- 2) The lead wire of microswitch has a connector, which is connected to the other lead wire with a special jig. If the lead wire is cut or the connector is damaged, solder the lead directly to the microswitch terminal with an insulating tape wound around the terminal.
- 3) Never put the unit upside down on the hard plate with the head cover removed. The pin of the tape shifter, the shut-off arm pin, the tension arm and others will be bent because of the weight of the unit. If it is necessary to put the unit upside down, put it on a soft cloth with the head cover attached.
- 4) When replacing the chassis, cut threads on it with a hexagon tapping screw.

Part No.

\*7-685-146-31 (for 3 mm dia.)

⊕ P 3 x 8

\*7-685-159-04 (for 4 mm dia.)

⊕ P 4 x 8



## SECTION 3

### ADJUSTMENT PROCEDURES

#### 3-1. MECHANICAL ADJUSTMENTS

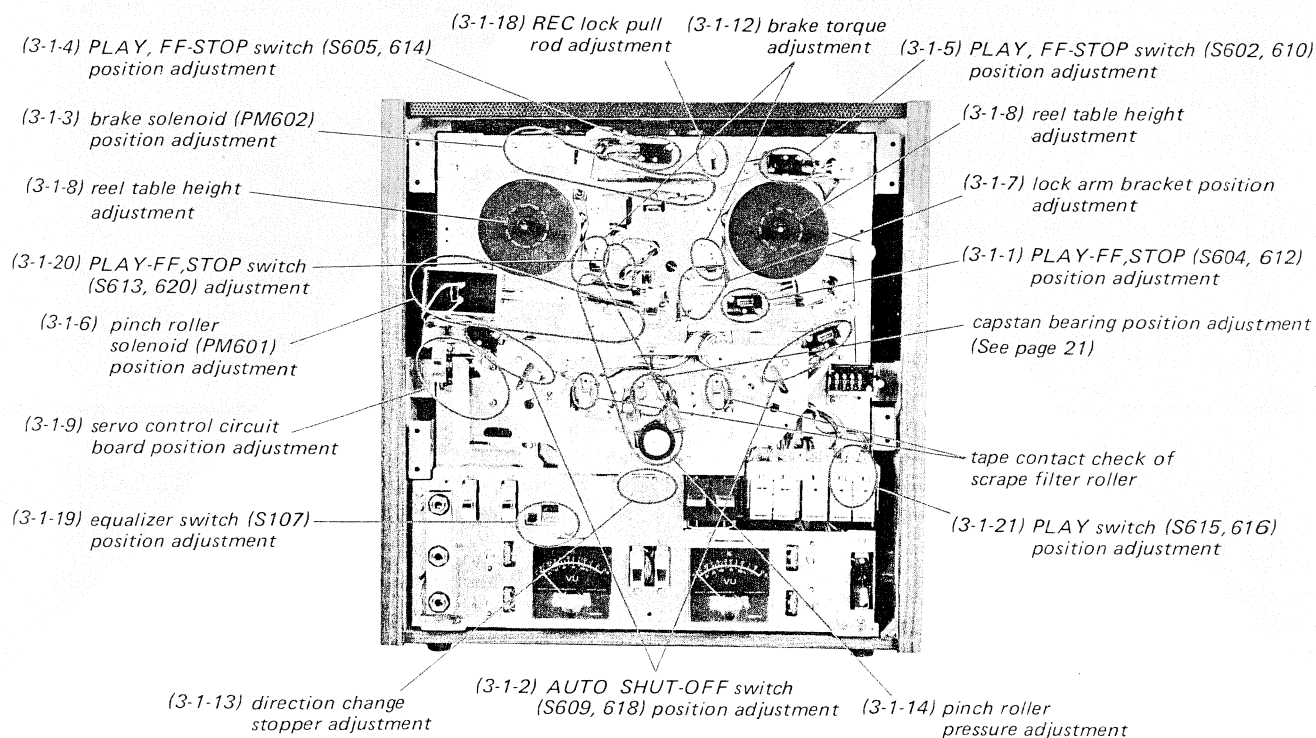


Fig. 3-1. Adjusting parts locations (1)

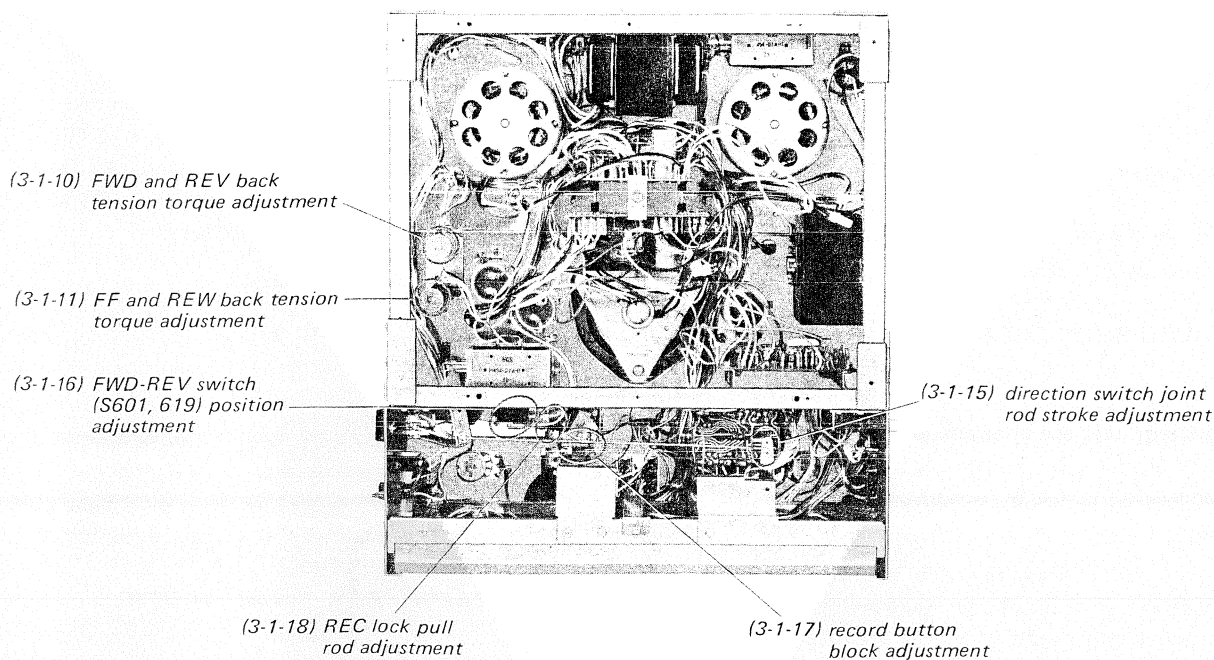


Fig. 3-2. Adjusting parts locations (2)

## Note:

When the unit is set to FWD, REV, FF, REW, or REC mode with the no tape threaded, hold the both actuator pins so that the AUTO SHUT-OFF switch is activated (a rubber band or a piece of masking tape will hold the actuator as though tape were threaded on the unit).

### 3-1-1. PLAY-FF, STOP Switch (S604, 612) Position Adjustment

Make the following adjustments by loosening the two microswitch holding screws. See Fig. 3-3. After that, apply lock paint to them.

1. STOP mode (Lock arm B is locked)  
Make sure that the actuator of microswitch is perfectly pushed with the plate spring as shown in Fig. 3-3.
2. FWD or REV mode (Lock arm B is released.)  
The actuator of microswitch should not be pushed by the plate spring at all.
3. STOP to FWD (or REV) mode  
S604 should be released approximately one second after S612 is released.

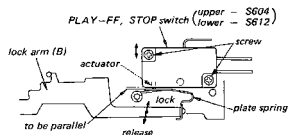


Fig. 3-3. PLAY-FF, STOP switch (S604, 612) position adjustment

### 3-1-2. AUTO SHUT-OFF Switch (S609, 618) Position Adjustment

1. Make sure that the bent portion of the actuator pin is positioned vertically against the chassis. If necessary, adjust by bending the base of the pin.
2. Loosen the two microswitch holding screws. Adjust the position of the microswitch so that the switch is turned ON by the actuator pin at the position shown in Fig. 3-4.
3. Apply lock paint to the screws.

## Note:

Adjust for both AUTO SHUT-OFF switch in the same way.

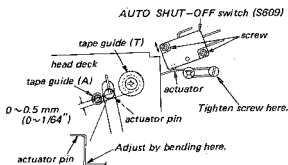


Fig. 3-4. AUTO SHUT-OFF switch (S609, 618) position adjustment

### 3-1-3. Brake Solenoid (PM602) Position Adjustment

1. Turn OFF the power. Unhook either end of the spring and loosen the four solenoid holding screws. See Fig. 3-5.
2. Push the solenoid shaft to the full with a hand in the direction shown by the arrow. Adjust the position of the solenoid so that the clearance between the timing lever and the lock lever is 0 to 0.5 mm (1/64"). Make this adjustment perfectly otherwise an unusual noise is produced because of the vibration of the brake lever.
3. Hook the spring again and turn ON the power. Change the mode from FWD (REV) to STOP and vice versa several times. Make sure that the unusual noise is not produced. Adjust the position of the solenoid, if necessary.
4. Apply lock paint to the screws.

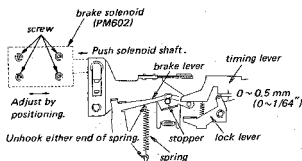


Fig. 3-5. Brake solenoid (PM602) position adjustment

### 3-1-4. PLAY,FF-STOP Switch (S605, 614) Position Adjustment

1. Place the unit in the FF or REW mode, to energize the brake solenoid. Check to see that the actuator of microswitch is perfectly pushed with the plate spring and also that the no clearance between the microswitch and the plate spring is obtained as shown in Fig. 3-6. If necessary, adjust the position of the microswitch by loosening the two switch holding screws.
2. Apply lock paint to the screws.

#### Note:

Be careful not to turn OFF the microswitch with the solenoid energized, as the thermistor (Pth601) on the relay circuit board will be damaged because of an unusual current.

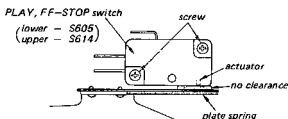


Fig. 3-6. PLAY, FF-STOP switch (S605, 614) position adjustment

### 3-1-5. PLAY,FF-STOP Switch (S602, 610) Position Adjustment

1. Place the unit in the FF or REW mode, to energize the brake solenoid. Check to see that the actuator of microswitch is perfectly pushed with the timing lever as shown in Fig. 3-7. If necessary, adjust the position of the microswitch by loosening the two switch holding screws.
2. Apply lock paint to the screws.

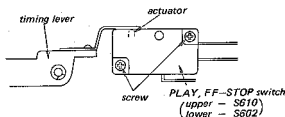


Fig. 3-7. PLAY, FF-STOP switch (S602, 610) position adjustment

### 3-1-6. Pinch Roller Solenoid (PM601) Position Adjustment

1. Loosen the three solenoid holding screws, shown in Fig. 3-8.
2. Place the unit in the FWD or REV mode to energize the solenoid. Adjust the position of the solenoid so that the clearance between the pinch roller pressure adjusting plate and the plunger solenoid drive arm is 0.5 mm (1/64") to 1 mm (3/64"). Tighten the screws. The solenoid shaft should be attracted straight on the line and in parallel with the solenoid.
3. Apply lock paint to the screws.

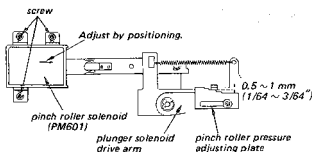


Fig. 3-8. Pinch roller solenoid (PM601) position adjustment

### 3-1-7. Lock Arm Bracket Position Adjustment

1. Make sure that the clearance between the lock arm (A) and the lock arm (B) is 0.5 ~ 1 mm (1/64 ~ 3/64") in the FWD (or REV) mode. In the STOP mode the clearance between the lock arm (A) and the lock arm (B) should be approximately 1 mm (3/64"). See Fig. 3-9.
2. Loosen the two lock arm bracket holding screws, if necessary. See Fig. 3-9.
3. Adjust the position of the lock arm bracket. Tighten the screws.
4. Apply lock paint to the screws.

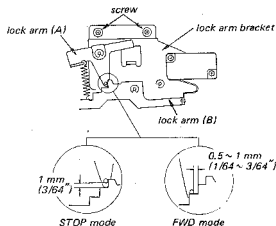


Fig. 3-9. Lock arm bracket position adjustment

### 3-1-8. Reel Table Height Adjustment

1. Use a 7 inch reel.
2. Thread the tape along the tape path. Place the unit in the FWD mode. If the tape touches either flange of the reel, adjust the reel table height by loosening the two set screws with an allen wrench. Here the both upper and lower clearances between the tape and the reel flange should be the same.
3. Tighten the set screws.

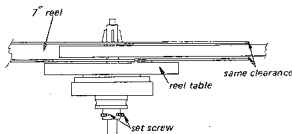


Fig. 3-10. Reel table height adjustment

### 3-1-9. Servo Control Circuit Board Position Adjustment

1. Loosen the two servo control circuit board holding screws shown in Fig. 3-11. Set the tape speed switch to the 9.5 cm/s (3-3/4 ips) position (center).
2. Thread the tape along the tape path. Place the unit in the FWD mode. Adjust the position of the servo control circuit board together with the heat sink so that the TAPE SPEED is 9.5 cm/s. Tighten the screws.

3. Make sure that the tape speed changes definitely, when the TAPE SPEED switch is slowly changed to the 4.8 cm/s, 9.5 cm/s and 19 cm/s positions. Readjust the position of the servo control circuit board, if necessary.
4. Apply lock paint to the screws.

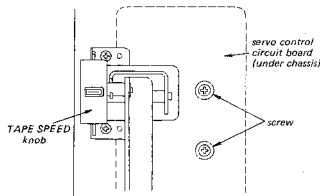


Fig. 3-11. Servo control circuit board position adjustment

### 3-1-10. FWD and REV Back Tension Torque Adjustment

#### Note:

Instructions in [ ] are applied to the REV back tension torque adjustment.

1. Place a 7" reel with string wound several turns counterclockwise [clockwise] onto the FWD [REV] supply reel table. Tie the string to the spring scale.
2. Measure the back tensions by pulling the 0 to 400 g (14 oz) spring scale at approximately 9.5 cm/s (3-3/4 ips) speed in FWD [REV] mode. See Fig. 3-12. It should be 200 to 240 g·cm (2.78 to 3.32 oz·inch).
3. Adjust the slider of R609 by loosening the screws, if necessary.

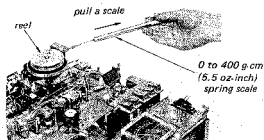


Fig. 3-12. FWD and REV back tension torque adjustment

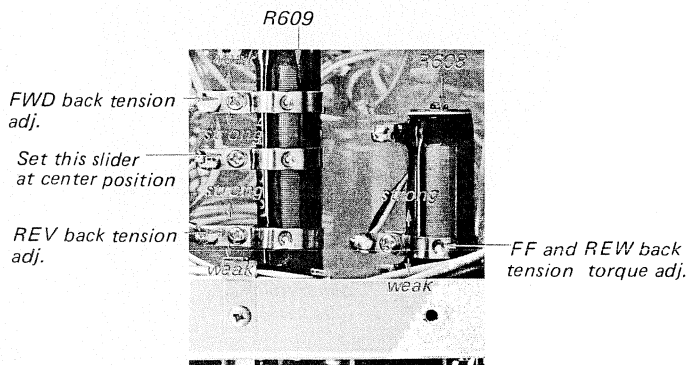


Fig. 3-13. Back tension torque adjusting parts location

### 3-1-11. FF and Rewind Back Tension Torque Adjustment

**Note:**

Instructions in [ ] are applied to the REW back tension adjustment.

1. Place a 7" reel with string wound several turns counterclockwise [clockwise] on the hub onto the FWD [REV] supply reel table. Tie the string to the spring scale.
2. Measure the back tension by pulling the 0 to 400 g (14 oz) spring scale at approximately 9.5 cm/s (3-3/4 ips) speed in FF [REW] mode. See Fig. 3-12. It should be 60 to 80 g.cm (0.83 to 1.1 oz inch).
3. Adjust the slider of R608 by loosening the screw, if necessary.

### 3-1-12. Brake Torque Adjustment

This adjustment should be performed for both supply and take-up sides.

**Note:**

Instructions in [ ] are applied to the take-up brake torque adjustment.

1. Place the unit in the STOP mode.
2. Place a 7" reel with string wound several turns counterclockwise [clockwise] on the hub onto

the reel table. Tie the string to a spring scale.

3. Pull the scale in the direction shown by the red arrow, making sure that the string does not touch either flange of the reel. The reel table will rotate counterclockwise [clockwise]. Take a reading only when the reel table is in steady motion.
4. The scale reading should be 900 g.cm (12.5 oz. inch) to 1,200 g.cm (16.7 oz. inch).
5. Rewind the string by turning the reel clockwise [counterclockwise].
6. Turn string several times clockwise [counterclockwise] on the hub onto the reel table.
7. Pull the scale in the direction shown by the black arrow, making sure that the string does not touch either flange of the reel. The reel table will rotate clockwise [counterclockwise]. Take a reading only when the reel table is in steady motion.
8. The scale reading should be 300 g.cm (4.17 oz. inch) to 400 g.cm (5.55 oz. inch).
9. If the satisfied results are not obtained, adjust by changing the hooking position of spring.

**Specification:**

**Brake Torque of Supply Reel**

in clockwise turning . . . . 300-400 g.cm  
(4.17-5.55 oz.inch)

in counterclockwise turning . . . . .  
900-1,200 g.cm  
(12.5-16.7 oz.inch)

**Brake Torque of Take-up Reel**

in clockwise turning . . . . 900-1,200 g.cm  
(12.5-16.7 oz.inch)

in counterclockwise turning . . . . .  
300-400 g.cm  
(4.17-5.55 oz.inch)

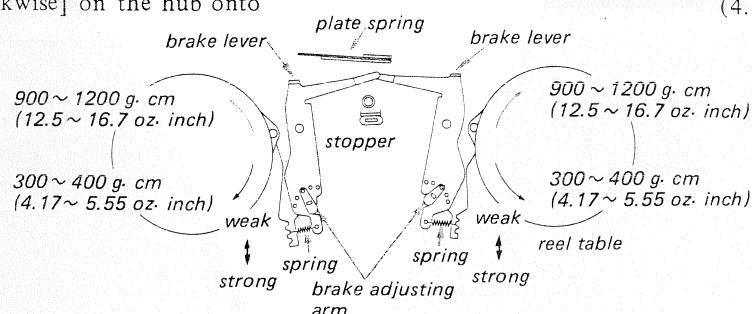


Fig. 3-14. Brake torque adjustment

### 3-1-13. Direction Change Stopper Position Adjustment

1. Loosen the stopper holding screw.
2. Place the unit in the FWD (or REV) mode. Adjust the position of the direction change stopper so that the clearance between the stopper and the tape direction change lever is 4 mm ( $5/32''$ ).
3. Change the mode from FWD to REV and vice versa several times. Make sure that the position of the pinch roller changes when the mode is changed.
4. Apply lock paint to the screws.

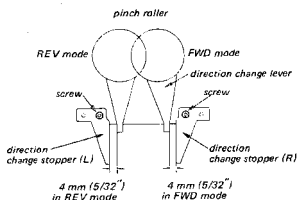


Fig. 3-15. Direction change stopper position adjustment

### 3-1-14. Pinch Roller Pressure Adjustment

1. Make a loop in a piece of string and attach the 0 to 1,600 g (3 lb 8 oz) spring scale around the base of the pinch roller shaft. See Fig. 3-16. Pull the scale. The pulling direction should be aligned with the pinch roller shaft and the capstan. Check the reading when the pinch roller just stops rotating. It should be 1,200 to 1,400 g (42 to 49 oz). If necessary, change the hooking position of the spring.

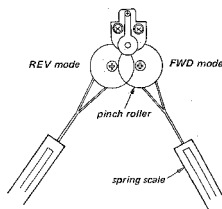
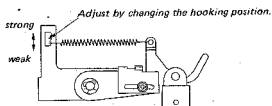


Fig. 3-16. Pinch pressure adjustment

### 3-1-15. Direction Switch Joint Rod Stroke Adjustment

1. Place the unit in the STOP mode. Push the tip of the direction switch lever slowly in the direction shown by the arrow in Fig. 3-17 as far as the slide switches on the playback and the bias osc. circuit boards are changed. (Do not move the position of switch).
2. Push the REV button. Make sure that the tip of the lever is pushed moreover by 0.5 ~ 1 mm ( $1/64 \sim 3/64''$ ) in the direction shown by the arrow by the solenoid.
3. Change the mode from the FWD to REV and vice versa several times and make sure that the slide switches are changed perfectly.
4. Change the position of direction switch joint rod to the direction change lever if necessary.

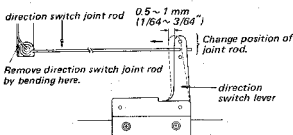


Fig. 3-17. Direction switch joint rod stroke adjustment

### 3-1-16. FWD-REV Switch (S601, 619) Position Adjustment

1. Loosen the two screws.
2. Place the unit in the REV mode to energize the direction change solenoid.
3. Adjust the position of the microswitch so that the actuator is perfectly pushed with the joint plate. Tighten the screws.
4. Apply lock paint to the screws.

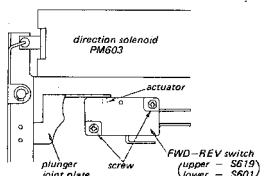


Fig. 3-18. FWD/REV switch (S601, 619) position adjustment

### 3-1-17. Record Button Block Adjustment

1. See Fig. 3-19. Place the unit in the STOP mode. Check to see that the clearance between the REC button block and the record arm holder is 0.5 (1/64") to 1 mm (3/64"). If necessary, adjust the position of the REC arm holder by loosening the screws.
2. Make sure that the slide switches (S103, 104) on the bias circuit board are perfectly switched, when the REC button is locked. Readjust the clearance between the REC button block and the REC arm holder, if necessary.
3. Apply lock paint to the screws.

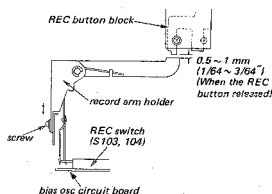


Fig. 3-19. Record button block adjustment

### 3-1-18. REC Lock Pull Rod Adjustment

1. Place the unit in the STOP mode. Turn the split nut clockwise until the tip of the REC lock pull rod is in contact with the REC lock rod. Moreover, turn the split nut slowly one or two times after the tip of the pull rod is in contact with the REC lock rod. Press the nut by using a pliers.
2. Make sure the followings.
  - a) Lock the REC button in the STOP mode. The REC button is released when the FWD or REV button is pushed.
  - b) Lock the REC button slowly in the STOP mode. The REC lamp lights before the button is locked.
  - c) Lock one of the two REC buttons in the STOP mode. The button is released when another is locked.
3. Apply contact cement to the nut.

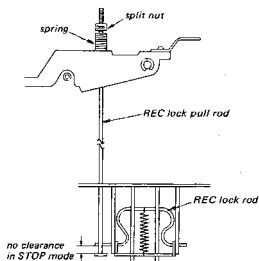


Fig. 3-20. REC lock pull rod adjustment

### 3-1-19. Equalizer Switch (S107) Position Adjustment

1. Loosen the two screws as shown in Fig. 3-21. Set the tape speed switch to the 9.5 cm/s (center) position.
2. Move the screws so that the equalizer switch is set at the 9.5 cm/s (center) position.
3. Change the tape speed switch to the 4.8 cm/s, 9.5 cm/s and 19 cm/s positions and vice versa several times. Make sure that the equalizer switch is definitely changed.
4. Apply lock paint to the screws.

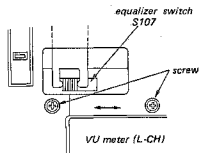


Fig. 3-21. Equalizer switch (S107) position adjustment

### 3-1-20. PLAY--FF, STOP Switch (S613, 620) Position Adjustment

1. Place the unit in the STOP mode. See Fig. 3-22. Make sure that the distance between the plunger joint plate and the leaf A of the leaf switch is 0 to 0.5 mm ( $1/64$ "), and also that the leaves A and B are in contact with each other completely. If necessary, adjust the switch position by loosening the screws.
2. Place the unit in the FWD (or REV) mode, to energize the pinch roller solenoid. Make sure that the leaves A and C are perfectly in contact with each other.
3. Apply lock paint to the screws.

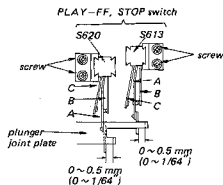


Fig. 3-22. PLAY-FF, STOP switch (S613, 620) position adjustment

### 3-1-21. PLAY Switch (S615, 616) Position Adjustment

1. Make sure that S615 (S616) is turned ON when the FWD (or REV) button is pushed and also that it is turned OFF when the button is released. If necessary, adjust the position of PLAY switch S615 (or S616) by loosening the

screw A (or screw B) in Fig. 3-23. Make sure that the switch is not turned ON by the play of the FWD button.

2. Apply lock paint to the screws A and B.

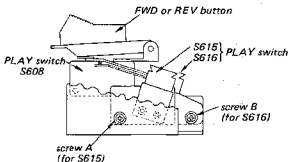


Fig. 3-23. PLAY switch (S615, 616) position adjustment

### 3-1-22 Adjustments after Head Replacement

#### For FWD Direction

When replacement of more than two heads are required, leave one of them unremoved for the reference of adjustments. Do not remove all the heads at the same time.

#### A) Playback Head Replacement

1. Replace the playback head by removing the angle adjusting screws. See Fig. 3-26. Do not move the height and zenith adjusting screws.
2. Play back the alignment tape (J-19-A-2). Make the azimuth and angle adjustments. See page 23.
3. Paint the head core with black ink as shown in Fig. 3-24.

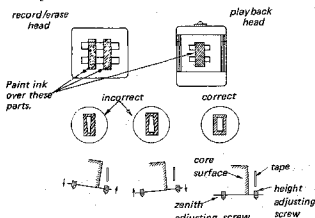


Fig. 3-24. Head zenith and height adjustment



- After the ink dried, run the tape in the FWD direction for 20 to 30 seconds. Watch the ink on the core fading away. When the same wide amount of the faded away part cannot be obtained at every point, turn the zenith and height adjusting screws in the direction shown by the arrows. See Fig. 3-24.

Repeat this step several times until the satisfied result is obtained. After the adjustment clean the core with a soft cloth dampened with denatured alcohol.

- For the record head tracking adjustment, connect a VTVM and a 100 k $\Omega$  resistor in parallel with the LINE OUT jack, deliver the 1 kHz signal (-60 dB) to the MIC jack. Set the MONITOR switch to the TAPE position. Place the unit in a normal stereo record mode. Turn the record head zenith and height adjusting screws in the same amount of the same direction so that the same maximum output can be obtained at both channels.
- Play back the alignment tape (J-19-A3), and make the playback azimuth adjustment again.
- Make the playback level and equalizer adjustments. See page 23 and 24.
- Apply lock paint to the adjusting screws.

#### B) Record/Erase Head Replacement

- Remove the azimuth adjusting screw and the head holding screw (with spring). Replace the head with the mounting plate. Do not move the zenith and height adjusting screws.
- Make the record head azimuth adjustment. See page 25.

- Paint the record/erase head cores with ink as shown in Fig. 3-24.
- After the ink dried, run the tape in the FWD direction for 20 to 30 seconds. Watch the ink on the core fading away. When the ink does not fade away in the same wide amount at every point, turn the zenith and height adjusting screws in the direction shown by the arrows. See Fig. 3-24. Repeat this step several times until the satisfied result is obtained. After adjustment clean the cores with a soft cloth dampened with denatured alcohol.
- Make the record head azimuth adjustment again. See page 25.
- Make the record head track adjustment. See page 25.
- Make the record bias adjustment, overall frequency response and erase ratio Measurement.
- Make sure that the positioning relation between the head core and the tape is correct. See Fig. 3-25.
- Apply lock paint to the adjusting screws.

#### For REV Direction

The tape guide (4), which is used for the REV tape path adjustment, should not be adjusted in the head replacement.

The adjustments after playback and record/erase head replacement are the same in procedure as in the FWD head replacement.

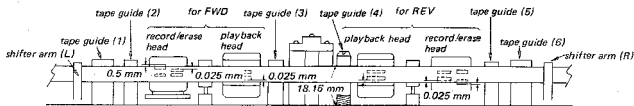


Fig. 3-25. Head adjustment

### Checks After Mechanical Adjustment

#### 1. Torque Check

- FWD, REV torque ... more than 200 g. cm  
(2.78 oz. inch)
- FF, REW torque ..... more than 100 g. cm  
(1.39 oz. inch)
- FWD, REV back tension  
..... 200 – 240 g. cm\*  
(2.78–3.32 oz. inch)
- FF, REW back tension  
..... 60 – 80 g. cm\*  
(0.83–1.1 oz. inch)
- \* : adjustable

#### 2. After making adjustments, clean the following parts with a soft cloth dampened with denatured alcohol; head core, tape guide, pinch roller, scrape filter roller, brake contact part of the reel table.

#### 3. Tape Contact Check of Scrape Filter Roller

- Thread a 7-inch tape along the tape path and set the tape speed switch to the 4.8 cm/s position.
- Run the tape. Make sure that the scrape filter roller is rotating. Stop the roller by fingers. Make sure that the roller starts rotating again when taking off the fingers from the roller. If necessary, adjust the position of the scrape filter roller by loosening the screw.

#### 4. Wow and Flutter Measurement

Make measurements at the beginning and the end of the tape. The measurement may be done with the unit set to either FWD and REV mode.

\*At 19 cm/s (7-1/2 ips) and 9.5 cm/s (3-3/4 ips) tape speed

#### Steps

- Connect a wow meter and a 100-k $\Omega$  resistor in parallel with the LINE OUT jack.
- Set the MONITOR switch to TAPE.
- Play back the alignment tape indicated below.
- Make sure that the satisfied result is obtained on the wow meter.

| tape speed              | specification                | remarks                                     |
|-------------------------|------------------------------|---|
| 19 cm/s<br>(7-1/2 ips)  | less than<br>0.12 %<br>(RMS) | Play back SONY<br>alignment tape<br>WS-19-7 |
| 9.5 cm/s<br>(3-3/4 ips) | less than<br>0.15 %<br>(RMS) | Play back SONY<br>alignment tape<br>WS-9-7  |

\*At 4.8 cm/s (1-7/8 ips) tape speed

#### Steps

- Set the record volume controls to the position specified in Precaution (8) on page 19.
- Connect a wow meter and a 100-k $\Omega$  resistor in parallel with the LINE OUT jack.
- Set the MONITOR switch to TAPE.
- Deliver a 3-kHz signal of -60 dB (-10 dB) to the MIC (AUX) jack.
- Record the signal on the blank tape.
- Make sure that the satisfied result is obtained on the wow meter.

Specification : less than 0.40 % (RMS)

## 3-2. ELECTRICAL ADJUSTMENTS

## Precaution:

Before making adjustment, make sure to read the following carefully.

- (1) Equipment to be required are as follows:

Audio oscillator (AF OSC)

Attenuator (ATT)

VTVM

Oscilloscope

Digital frequency counter

SONY alignment tape

\*J-19-A2 (for head azimuth and angle adj.)

\*J-19-F2 (for 19cm/s level and equalizer adj.)

\*J-9-F1 (for 9.5 cm/s level and equalizer adj.)

\*SPC-47 (for tape speed adj.)

Fixed resistors

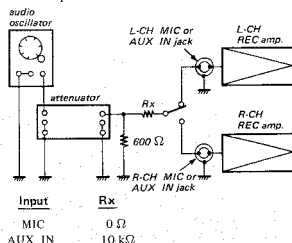
600  $\Omega$ , 300  $\Omega$ , 10 k $\Omega$ , 100 k $\Omega$

- (2) SONY alignment tapes contain the following information in the sequence indicated.

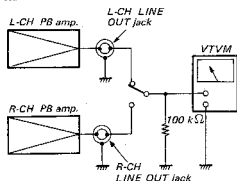
| SONY<br>NAME | 1st              | 2nd              | 3rd              | 4th              | 5th             | 6th              | 7th             |
|--------------|------------------|------------------|------------------|------------------|-----------------|------------------|-----------------|
| J-19-A2      | 12.5 kHz, -10 dB |                  |                  |                  |                 |                  |                 |
| J-19-F2      | 400 Hz<br>-10 dB | 400 Hz<br>-10 dB | 10 kHz<br>-10 dB | 10 kHz<br>-10 dB | 7 kHz<br>-10 dB | 80 Hz<br>-10 dB  | 40 Hz<br>-10 dB |
| J-9-F1       | 5 kHz<br>-10 dB  | 400 Hz<br>-10 dB | 400 Hz<br>-10 dB | 5 kHz<br>-10 dB  | 5 kHz<br>-10 dB | 200 Hz<br>-10 dB | 80 Hz<br>-10 dB |
| SPC-47       | 4 kHz, 0 dB      |                  |                  |                  |                 |                  |                 |

- (3) Make sure to demagnetize the record/erase and playback heads with a soft cloth dampened with denatured alcohol.
- (4) Make sure to demagnetize the record/erase and playback heads by using a head demagnetizer.
- (5) Equipment Connection

Input side



Output side



- (6) Input and output levels are specified as follows, unless otherwise specified.

Normal input level

|                         | MICRO-<br>PHONE      | AUX IN              |
|-------------------------|----------------------|---------------------|
| Signal source impedance | 300 $\Omega$         | 10 k $\Omega$       |
| Input signal level      | -60 dB<br>(0.775 mV) | -10 dB<br>(0.245 V) |

Normal output level

|               | LINE OUT       |
|---------------|----------------|
| Load resistor | 100 k $\Omega$ |
| Output level  | 0 dB (0.775 V) |

- (7) The switches should be set to the following position, unless otherwise specified.

\*TAPE SPEED — 19cm/s (7½ ips)

\*TAPE SELECT — NORMAL

\*AUTO REV — NON REV

- (8) The record volume controls should be set to the following position, unless otherwise specified.

\*MIC volume control (In using the MIC jack)

Turn the AUX volume controls fully counter-clockwise, set the MONITOR switch to SOURCE and deliver a 1 kHz signal of -60 dB (0.775 mV) to the MIC jack. Adjust the MIC volume controls so that the VTVM reads 0 dB (0.775 V).

\*AUX volume control (In using the AUX IN jack)

Turn the MIC volume controls fully counter-clockwise, set the MONITOR switch to SOURCE and deliver a 1 kHz signal of -10 dB (0.245 V) to the AUX IN jack. Adjust the AUX volume controls so that the VTVM reads 0 dB (0.775 V).

- (9) The adjustments should be performed in the sequence, unless otherwise specified.

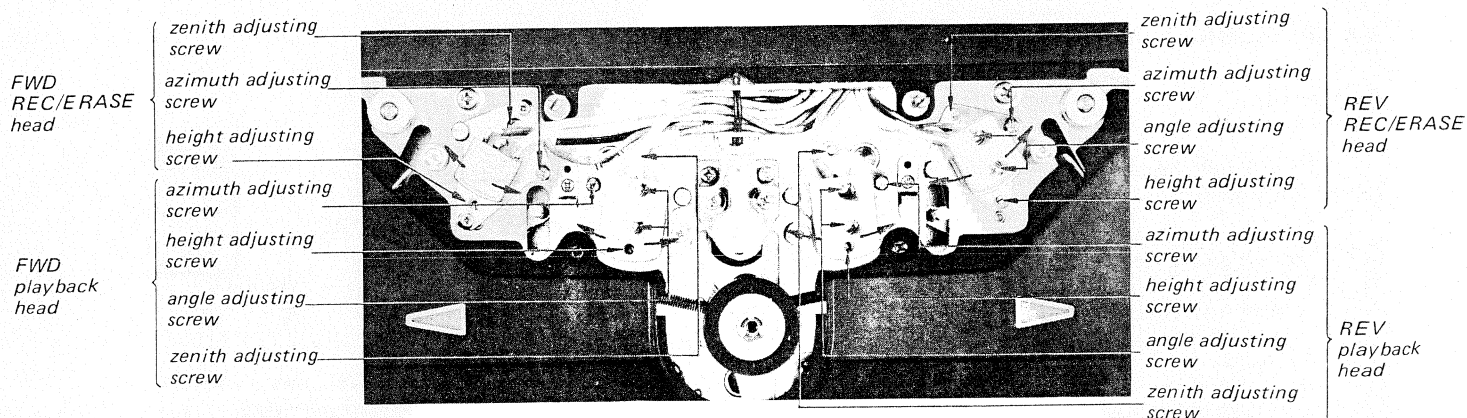


Fig. 3-26. Adjusting parts location (1)

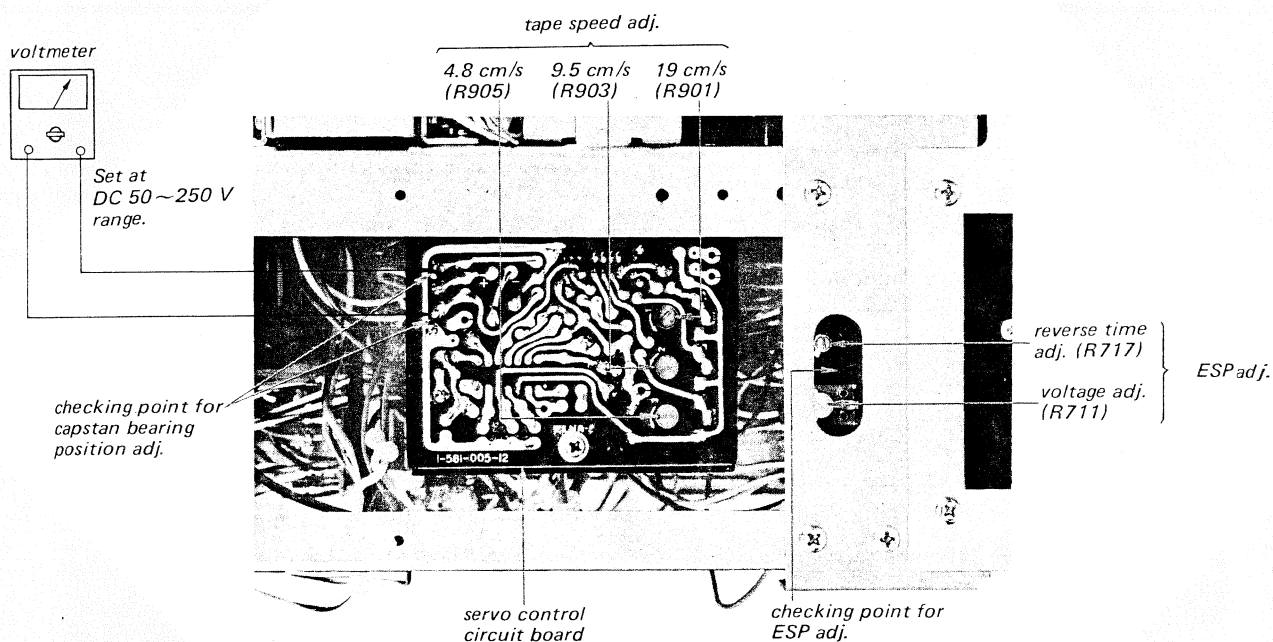


Fig. 3-27. Adjusting parts location (2)

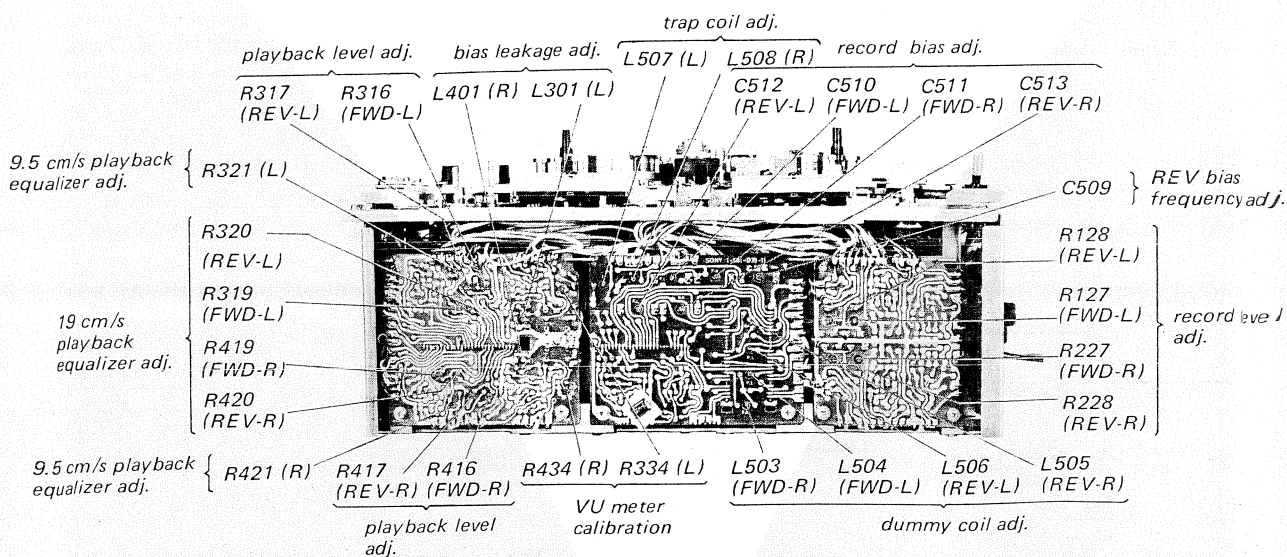
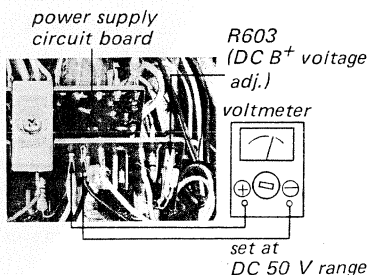
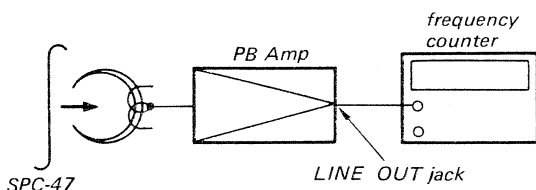
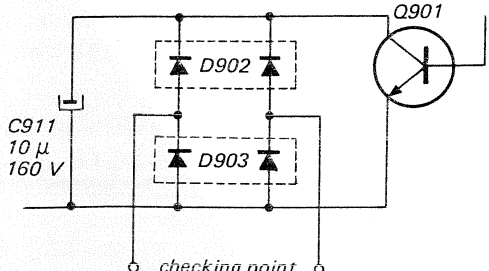
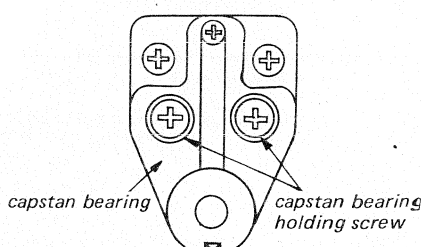
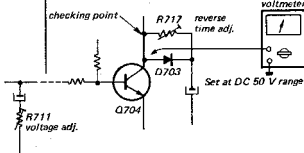
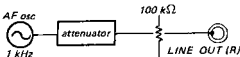
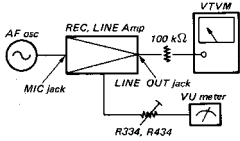
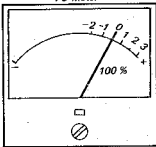
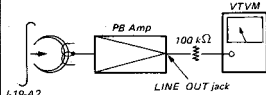
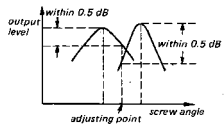
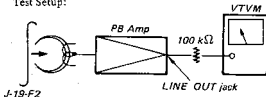
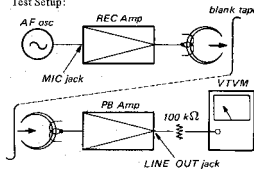


Fig. 3-28. Adjusting parts location (3)

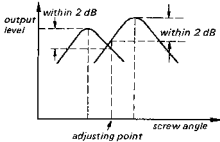
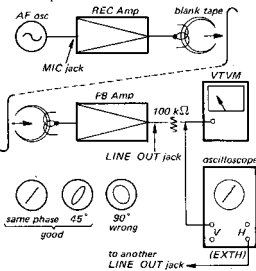
| Items   | Remarks   | Procedures  |                 |                        |                               |                         |                               |                         |                               |  |            |                 |                 |                     |                    |                        |                      |                    |                        |                      |                    |                        |
|---|---|---|-----------------|------------------------|-------------------------------|-------------------------|-------------------------------|-------------------------|-------------------------------|--|------------|-----------------|-----------------|---------------------|--------------------|------------------------|----------------------|--------------------|------------------------|----------------------|--------------------|------------------------|
| 1. DC B +<br>Voltage<br>Adjustment              | <p>Test Setup:</p>  <p>Specification: <math>24 \pm 0.5</math> V</p> <p><b>Note:</b> Make sure that ac power source voltage is correct.</p>   | <p>(1) Place the unit in the STOP mode.</p> <p>(2) Adjust R603 to obtain <math>24 \pm 0.5</math> V on the voltmeter (20 k<math>\Omega</math>/V).</p> <p><b>CAUTION:</b></p> <p>Do not short-circuit between B<sup>+</sup> circuit and ground, or transistor Q602 will be broken.</p>  |                 |                        |                               |                         |                               |                         |                               |  |            |                 |                 |                     |                    |                        |                      |                    |                        |                      |                    |                        |
| 2. Tape Speed<br>Adjustment                     | <p>Test Setup:</p>  <p>Switch Setting:</p> <p>MONITOR switch . . . . . TAPE</p> <p>Specifications</p> <table><thead><tr><th>tape speed</th><th>counter reading</th></tr></thead><tbody><tr><td>19 cm/s<br/>(7-1/2 ips)</td><td>4000 <math>\pm</math> 40 Hz (<math>\pm</math> 1 %)</td></tr><tr><td>9.5 cm/s<br/>(3-3/4 ips)</td><td>2000 <math>\pm</math> 20 Hz (<math>\pm</math> 1 %)</td></tr><tr><td>4.8 cm/s<br/>(1-7/8 ips)</td><td>1000 <math>\pm</math> 20 Hz (<math>\pm</math> 2 %)</td></tr></tbody></table> | tape speed  | counter reading | 19 cm/s<br>(7-1/2 ips) | 4000 $\pm$ 40 Hz ( $\pm$ 1 %) | 9.5 cm/s<br>(3-3/4 ips) | 2000 $\pm$ 20 Hz ( $\pm$ 1 %) | 4.8 cm/s<br>(1-7/8 ips) | 1000 $\pm$ 20 Hz ( $\pm$ 2 %) | <p>(1) Play back the beginning of SONY alignment tape SPC-47 in horizontal position.</p> <p>(2) Adjust R901, R903 and R905 for the counter reading shown in the table below.</p> <table><thead><tr><th>tape speed</th><th>allowable range</th><th>adjusting parts</th></tr></thead><tbody><tr><td>19 cm/s (7-1/2 ips)</td><td>4000 Hz <math>\pm</math> 5 Hz</td><td>R901 10 k<math>\Omega</math> (B)</td></tr><tr><td>9.5 cm/s (3-3/4 ips)</td><td>2000 Hz <math>\pm</math> 3 Hz</td><td>R903 20 k<math>\Omega</math> (B)</td></tr><tr><td>4.8 cm/s (1-7/8 ips)</td><td>1000 Hz <math>\pm</math> 2 Hz</td><td>R905 50 k<math>\Omega</math> (B)</td></tr></tbody></table> <p>(3) Make sure that the specifications shown in left table is satisfied at the beginning and end of tape in forward and reverse mode, with the unit placed in both horizontal and vertical position.</p> <p><b>Note:</b> Take the reading of a frequency counter after more than 5 seconds since the semi-fixed resistor has been finished to turn.</p> | tape speed | allowable range | adjusting parts | 19 cm/s (7-1/2 ips) | 4000 Hz $\pm$ 5 Hz | R901 10 k $\Omega$ (B) | 9.5 cm/s (3-3/4 ips) | 2000 Hz $\pm$ 3 Hz | R903 20 k $\Omega$ (B) | 4.8 cm/s (1-7/8 ips) | 1000 Hz $\pm$ 2 Hz | R905 50 k $\Omega$ (B) |
| tape speed                                      | counter reading   |   |                 |                        |                               |                         |                               |                         |                               |  |            |                 |                 |                     |                    |                        |                      |                    |                        |                      |                    |                        |
| 19 cm/s<br>(7-1/2 ips)                          | 4000 $\pm$ 40 Hz ( $\pm$ 1 %)   |   |                 |                        |                               |                         |                               |                         |                               |  |            |                 |                 |                     |                    |                        |                      |                    |                        |                      |                    |                        |
| 9.5 cm/s<br>(3-3/4 ips)                         | 2000 $\pm$ 20 Hz ( $\pm$ 1 %)   |   |                 |                        |                               |                         |                               |                         |                               |  |            |                 |                 |                     |                    |                        |                      |                    |                        |                      |                    |                        |
| 4.8 cm/s<br>(1-7/8 ips)                         | 1000 $\pm$ 20 Hz ( $\pm$ 2 %)   |   |                 |                        |                               |                         |                               |                         |                               |  |            |                 |                 |                     |                    |                        |                      |                    |                        |                      |                    |                        |
| tape speed                                      | allowable range   | adjusting parts   |                 |                        |                               |                         |                               |                         |                               |  |            |                 |                 |                     |                    |                        |                      |                    |                        |                      |                    |                        |
| 19 cm/s (7-1/2 ips)                             | 4000 Hz $\pm$ 5 Hz  | R901 10 k $\Omega$ (B)  |                 |                        |                               |                         |                               |                         |                               |  |            |                 |                 |                     |                    |                        |                      |                    |                        |                      |                    |                        |
| 9.5 cm/s (3-3/4 ips)                            | 2000 Hz $\pm$ 3 Hz  | R903 20 k $\Omega$ (B)  |                 |                        |                               |                         |                               |                         |                               |  |            |                 |                 |                     |                    |                        |                      |                    |                        |                      |                    |                        |
| 4.8 cm/s (1-7/8 ips)                            | 1000 Hz $\pm$ 2 Hz  | R905 50 k $\Omega$ (B)  |                 |                        |                               |                         |                               |                         |                               |  |            |                 |                 |                     |                    |                        |                      |                    |                        |                      |                    |                        |
| 3. Capstan<br>Bearing<br>Position<br>Adjustment | <p>Test Setup:</p>  <p>Specification:</p> <p>voltmeter reading . . . . . maximum</p>   | <p>(1) Place the unit in the STOP mode.</p> <p>(2) Loosen the two capstan bearing holding screws.</p> <p>(3) Adjust the position of the capstan bearing so that the voltmeter reads a maximum.</p> <p>(4) Tighten the screws and apply lock paint to the screws.</p> <p>(See Fig. 3-1)</p>  |                 |                        |                               |                         |                               |                         |                               |  |            |                 |                 |                     |                    |                        |                      |                    |                        |                      |                    |                        |

| Items                   | Remarks   | Procedures  |
|-------------------------|---|---|
| 4. ESP Adjustment       | <p>Test Setup:</p> <p>(1) Connect a voltmeter (20 k<math>\Omega</math>/V) between checking point and ground.</p>  <p>(2) Deliver 1 kHz signal to R-CH LINE OUT jack.</p>  <p>Specification:</p> <p>Voltage at checking point ..... <math>10 \pm 0.5</math> V</p> <p>Reverse time ..... <math>8 \pm 2</math> sec</p> | <p>(1) Set the AUTO REV switch to CONT REV.</p> <p>(2) Deliver a 1 kHz of -43 dB (5.5 mV) to R-CH LINE OUT jack.</p> <p>(3) Place the unit in the forward mode.</p> <p>(4) Adjust R711 to obtain <math>10 \pm 0.5</math> V on the voltmeter.</p> <p>Note: Read after the indication of the voltmeter has been steady.</p> <p>(5) Thread a blank tape.</p> <p>(6) Change the input level from -43 dB (5.5 mV) to -33 dB (17 mV).</p> <p>(7) After passing more than 3 seconds since the level is changed, adjust R717 so that the tape transport direction will reverse at 6-10 seconds after changing to -63 dB (0.56 mV) from -33 dB (17 mV) again.</p> <p>(8) Repeat the above steps (2) through (7) so that the tape transport direction will be able to reverse surely in opposite direction.</p> <p>(9) With the AUTO REV switch set to REV position, repeat the above steps (6) and (7) and make sure that the tape transport direction of the unit reverses.</p> <p>(10) When changing the AUTO REV switch to NON REV, make sure that the tape transport direction of the unit does not reverse.</p> |
| 5. VU Meter Calibration | <p>Test Setup:</p>  <p>Switch Setting:</p> <p>MONITOR switch ..... SOURCE</p> <p>Specification:</p> <p><math>0 \pm 0.5</math> on the VU meter scale when the line output is 0 dB (0.775 V).</p>   | <p>(1) Deliver a 1 kHz signal of -60 dB (0.775 mV) to the MIC jack.</p> <p>(2) Place the unit in the stereo-record mode.</p> <p>(3) Adjust the MIC volume control for 0 dB (0.775 V) on the VTVM.</p> <p>(4) Adjust R334 and R434 so that the pointer of VU meter stays at <math>0 \pm 0.5</math> VU on the meter.</p> <p>(5) When changing the frequency from 1 kHz to 100 Hz and 10 kHz, make sure that the VU meter reads between -1 and +1 on the meter.</p>   |

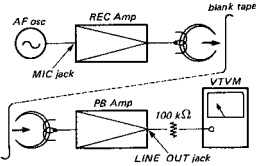
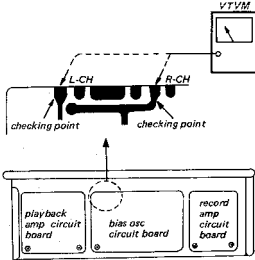
| Items   | Remarks  | Procedures  |
|---|--|---|
| 6. Playback Head Azimuth and Angle Adjustment | <p>Test Setup:</p>  <p>Switch Setting:<br/>MONITOR switch ..... TAPE</p> <p>Specification:<br/>Screw position where the maximum output is obtained.</p> <p>Notes:<br/>(1) Before the adjustment, make sure that the head comes in contact with the tape normally in forward mode.</p> | <p>(1) Play back the SONY alignment tape J-19-A2 (12.5 kHz).</p> <p>(2) Adjust the playback head azimuth adjusting screw for the maximum output on the VTVM.</p> <p>Note: If the maximum value for both channels can not be obtained at the same angle of the screw, take the mid between the two angles and make sure that the difference between the output obtained by turning the screw from the maximum output position and the each maximum output is within 0.5 dB.</p> <p>(3) Loosen the playback head angle adjusting screws.</p> <p>(4) Slightly, hold the supply reel table by the hand.</p> <p>(5) Adjust by moving the playback head in the direction shown by the arrows (See Fig. 3-26) so that the level fluctuation is the least at the maximum output and the playback output does not increase more than 0.5 dB.</p> <p>(6) Repeat the above steps (1) and (2).</p> <p>(7) Apply lock paint to the azimuth and angle adjusting screws.</p>  |
| 7. Playback Level Adjustment                  | <p>Test Setup:</p>  <p>Switch Setting:<br/>MONITOR switch ..... TAPE</p> <p>Specification:<br/>0 dB (0.775 V) ..... NORMAL<br/>-2.5 ~ -1.5 dB against NORMAL ..... SPECIAL</p> <p>Note: The adjustment should be performed for both L-CH and R-CH in forward and reverse modes.</p>  | <p>(1) Set the TAPE SELECT switch to NORMAL.</p> <p>(2) Play back the 1st tone (400 Hz, 0 dB) of the SONY alignment tape J-19-F2.</p> <p>(3) Adjust R316, R317, R416 and R417 for 0 dB (0.775 V) on the VTVM.</p> <p>R316 (L-CH forward run)<br/>R416 (R-CH forward run)<br/>R317 (L-CH reverse run)<br/>R417 (R-CH reverse run)</p> <p>(4) When changing the TAPE SELECT switch to SPECIAL, make sure that the VTVM reads between -2.5 dB and -1.5 dB (0.58 V and 0.64 V).</p>   |

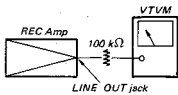
| Items                                       | Remarks   | Procedures   |        |                  |                |     |     |           |        |          |       |       |       |              |             |        |        |                  |                |           |     |     |     |     |           |       |       |        |       |              |             |        |        |        |  |
|---|---|--|--------|------------------|----------------|-----|-----|-----------|--------|----------|-------|-------|-------|--------------|-------------|--------|--------|------------------|----------------|-----------|-----|-----|-----|-----|-----------|-------|-------|--------|-------|--------------|-------------|--------|--------|--------|--|
| 8. Playback Equalizer Adjustment            | <p>Test Setup:<br/>Same as Item 7</p> <p>Switch Setting:<br/>MONITOR switch ..... TAPE</p> <p>Specification:<br/>Deviation against 400 Hz of 2nd tone</p> <table border="1"> <caption>at 19 cm/s tape speed with J-19-F2</caption> <tr> <th>tape tone</th><th>3rd</th><th>4th</th><th>5th</th><th>6th</th><th>7th</th></tr> <tr> <td>frequency</td><td>10 kHz</td><td>12.5 kHz</td><td>7 kHz</td><td>80 Hz</td><td>40 Hz</td></tr> <tr> <td>output level</td><td>L<br/>± 2 dB</td><td>± 3 dB</td><td>± 3 dB</td><td>+ 3 dB<br/>+ 1 dB</td><td>+ 5 dB<br/>0 dB</td></tr> </table> <p>Deviation against 400 Hz of 3rd tone</p> <table border="1"> <caption>at 9.5 cm/s tape speed with J-9-F1</caption> <tr> <th>tape tone</th><th>4th</th><th>5th</th><th>6th</th><th>7th</th></tr> <tr> <td>frequency</td><td>5 kHz</td><td>3 kHz</td><td>200 Hz</td><td>80 Hz</td></tr> <tr> <td>output level</td><td>L<br/>± 2 dB</td><td>± 2 dB</td><td>± 2 dB</td><td>± 2 dB</td></tr> </table> <p>Notes:</p> <ol style="list-style-type: none"> <li>(1) First, 19cm/s (7-1/2 ips) equalizer adjustment should be performed.</li> <li>(2) The adjustment should be performed for both L-CH and R-CH in forward and reverse modes.</li> <li>(3) Level difference between the forward and reverse modes should be within 1 dB.</li> </ol> | tape tone  | 3rd    | 4th              | 5th            | 6th | 7th | frequency | 10 kHz | 12.5 kHz | 7 kHz | 80 Hz | 40 Hz | output level | L<br>± 2 dB | ± 3 dB | ± 3 dB | + 3 dB<br>+ 1 dB | + 5 dB<br>0 dB | tape tone | 4th | 5th | 6th | 7th | frequency | 5 kHz | 3 kHz | 200 Hz | 80 Hz | output level | L<br>± 2 dB | ± 2 dB | ± 2 dB | ± 2 dB | <ol style="list-style-type: none"> <li>(1) Set the TAPE SPEED switch to 19cm/s (7-1/2 ips).</li> <li>(2) Play back the 2nd (400 Hz) and 3rd (10 kHz) tones of SONY alignment tape J-19-F2.</li> <li>(3) Adjust R319, R320, R419 and R420 so that the playback output of the 3rd tone is the same as that of the 2nd tone.<br/><br/>R319 (L-CH forward run)<br/>R419 (R-CH forward run)<br/>R320 (L-CH reverse run)<br/>R420 (R-CH reverse run)</li> <li>(4) Play back the 4th (12.5 kHz), 5th (7 kHz), 6th (80 Hz) and 7th (40 Hz) tones of SONY alignment tape J-19-F2 in order.</li> <li>(5) Make sure that the each deviation against 400 Hz of 2nd tone is within specification shown in the left table.</li> <li>(6) Set the TAPE SPEED switch to 9.5cm/s (3-3/4 ips).</li> <li>(7) Play back the 3rd (400 Hz) and 4th (5 kHz) tones of SONY alignment tape J-9-F1.</li> <li>(8) Adjust R321 and R421 so that the playback output of the 4th tone is the same as that of 3rd tone.<br/><br/>R321 (L-CH forward run)<br/>R421 (R-CH forward run)</li> <li>(9) Play back the 5th (3 kHz), 6th (200 Hz) and 7th (80 Hz) tones of SONY alignment tape J-9-F1 in order.</li> <li>(10) Make sure that the each deviation against 3rd (400 Hz) tone is within ±2 dB as shown in the left table.</li> </ol> |
| tape tone                                   | 3rd   | 4th  | 5th    | 6th              | 7th            |     |     |           |        |          |       |       |       |              |             |        |        |                  |                |           |     |     |     |     |           |       |       |        |       |              |             |        |        |        |  |
| frequency                                   | 10 kHz  | 12.5 kHz   | 7 kHz  | 80 Hz            | 40 Hz          |     |     |           |        |          |       |       |       |              |             |        |        |                  |                |           |     |     |     |     |           |       |       |        |       |              |             |        |        |        |  |
| output level                                | L<br>± 2 dB   | ± 3 dB   | ± 3 dB | + 3 dB<br>+ 1 dB | + 5 dB<br>0 dB |     |     |           |        |          |       |       |       |              |             |        |        |                  |                |           |     |     |     |     |           |       |       |        |       |              |             |        |        |        |  |
| tape tone                                   | 4th   | 5th  | 6th    | 7th              |                |     |     |           |        |          |       |       |       |              |             |        |        |                  |                |           |     |     |     |     |           |       |       |        |       |              |             |        |        |        |  |
| frequency                                   | 5 kHz   | 3 kHz  | 200 Hz | 80 Hz            |                |     |     |           |        |          |       |       |       |              |             |        |        |                  |                |           |     |     |     |     |           |       |       |        |       |              |             |        |        |        |  |
| output level                                | L<br>± 2 dB   | ± 2 dB   | ± 2 dB | ± 2 dB           |                |     |     |           |        |          |       |       |       |              |             |        |        |                  |                |           |     |     |     |     |           |       |       |        |       |              |             |        |        |        |  |
| 9. Record Head Azimuth and Angle Adjustment | <p>Test Setup:</p>  <p>Control/Switch Setting:</p> <p>*Record volume control<br/>..... specified position on page 19</p> <p>*MONITOR switch ..... TAPE</p>  | <ol style="list-style-type: none"> <li>(1) Deliver a 15 kHz of -80 dB (77.5 μV) to the MIC jack.</li> <li>(2) Place the unit in the Forward (reverse) mode.</li> <li>(3) Adjust the record head azimuth adjusting screw for the maximum output on the VTVM.</li> </ol> <p>Note: If the screw is turned more than 1 turn, make the record head track adjustment again.</p> <p>The maximum value for both channels can not be obtained at the same angle of the screw, take the mid between the two angles and make sure that the difference between the output obtained by turning the screw from the maximum output position and the each maximum output is within 2 dB.</p> |        |                  |                |     |     |           |        |          |       |       |       |              |             |        |        |                  |                |           |     |     |     |     |           |       |       |        |       |              |             |        |        |        |  |

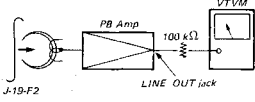
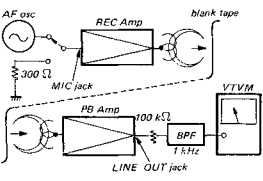


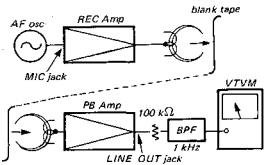
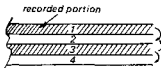
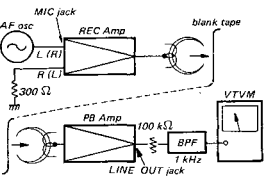
| Items                                    | Remarks  | Procedures   |
|--|--|--|
| Record Head Azimuth and Angle Adjustment | <p>Specification:</p> <p>*Screw position where the maximum output is obtained.</p>   | <p>(4) Slightly, hold the supply reel table by the hand.</p> <p>(5) Make sure that the playback output does not increase more than 3 dB. If not, adjust by moving the record head in the direction shown by the arrows (See Fig. 3-26) so that the level fluctuation is the least at the maximum output.</p> <p>(6) Apply lock point to the azimuth and angle adjusting screws.</p>   |
| 10. Record Head Track Adjustment         | <p>Test Setup:</p>  <p>Control/Switch Setting:</p> <p>*Record volume control<br/>..... specified position on page 19</p> <p>*MONITOR switch ..... TAPE</p> <p>Specification:</p> <p>*Lissajous figure on scope ..... within 45°</p> <p>*Playback output ..... maximum</p> <p>Notes:</p> <p>(1) Before the adjustment, make sure that the height of head is normal against the tape in the forward mode.</p> | <p>(1) Thread a blank tape.</p> <p>(2) Place the unit in the record mode.</p> <p>(3) Deliver a 1 kHz signal of -60 dB (0.775 mV) to the MIC jack.</p> <p>(4) Adjust the record head azimuth adjusting screw so that the lissajous figure on the scope is within 45°.</p> <p>(5) Carefully noting how many turns the screw is turned, adjust the record head height adjusting screw for the maximum output on the VTVM.</p> <p>(6) Turn the record head zenith adjusting screw in the same direction by the same turns as noted in the above step (5).</p> <p>Note: If the maximum value for both channels can not be obtained at the same angle of the screw, take the mid between the two angles and then make sure that the level difference from the each maximum value is less than 1 dB.</p> <p>(7) Check the record head azimuth adjustment.</p> |

| Items                                 | Remarks   | Procedures  |
|---------------------------------------|---|---|
| Record Head Track Adjustment          | (2) Perform this adjustment after that for the playback head was done.  |   |
| 11. Dummy Coil Adjustment             | <p>Test Setup:</p> <p>Control/Switch Setting:</p> <p>* Record volume control<br/>..... Specified position on page 19</p> <p>* MONITOR switch ..... TAPE</p>   | <ol style="list-style-type: none"> <li>Thread a blank tape.</li> <li>Deliver a 20 kHz signal of <math>-80</math> dB (<math>77.5 \mu\text{V}</math>) to the MIC jack.</li> <li>Place the unit in the stereo-record mode.</li> <li>Note the VTVM reading.</li> <li>Place only L-CH in the record mode.</li> <li>Adjust LS04 slowly so that the VTVM reading is the same as the value obtained in the step 4.</li> </ol> <p>LS04 (L-CH forward run)<br/>LS03 (R-CH forward run)<br/>LS06 (L-CH reverse run)<br/>LS05 (R-CH reverse run)</p>          |
| 12. Reverse Bias Frequency Adjustment | <p>Test Setup:</p> <p>Control Setting:</p> <p>Record volume control<br/>..... fully counterclockwise</p> <p>Specification:</p> <p>Less than <math>-10</math> dB</p> <p><b>Note:</b> Perform after the trap coil adjustment.</p> | <ol style="list-style-type: none"> <li>Place the unit in the reverse-stereo record mode.</li> <li>Adjust CS09 so that the VTVM reads a minimum (less than <math>-10</math> dB).</li> </ol> <p><b>Note:</b> If the minimum value for both channels can not be obtained at the same angle of the trimmer capacitor, take the mid between the two angles.</p> <p>After the adjustment, make sure that the VTVM reads less than <math>-10</math> dB.</p> <ol style="list-style-type: none"> <li>Apply lock paint to the trimmer capacitor.</li> </ol> |

| Items                                     | Remarks  | Procedures   |
|---|--|--|
| 13. Record Bias Adjustment                | <p>Test Setup:</p>  <p>Control/Switch Setting:</p> <ul style="list-style-type: none"> <li>*Record volume control ..... specified position on page 19</li> <li>*MONITOR switch ..... TAPE</li> </ul> <p>Specification:</p> <ul style="list-style-type: none"> <li>*0 +1 dB .... at peak bias point</li> <li>*0 ± 2 dB .... playback output of 18 kHz signal against that of 1 kHz signal</li> </ul> <p>Note: The adjustment should be performed for both L-CH and R-CH in forward and reverse modes.</p> | <ol style="list-style-type: none"> <li>Turn C510, C511, C512 and C513 clockwise to the full and return them approximately three times.</li> <li>Thread a blank tape.</li> <li>Deliver a 1 kHz signal of -80 dB (77.5 μV) to the MIC jack.</li> <li>Place the unit in the stereo-record mode.</li> <li>Slowly, turn C510, C511, C512 and C513 clockwise, and the VTVM reading will go up and reach a maximum.<br/><br/>So note the VTVM reading.<br/><br/>C510 (L-CH forward run)<br/>C511 (R-CH forward run)<br/>C512 (L-CH reverse run)<br/>C513 (R-CH reverse run)</li> <li>Change the input signal frequency from 1 kHz to 18 kHz.</li> <li>Turn C510, C511, C512 and C513 further clockwise so that the VTVM reading is the same as the value noted in the step (5).<br/><br/>Note: Make sure that the VTVM reading does not fall more than 1 dB from the maximum output obtained in the step (5).</li> <li>Apply lock paint to the trimmer capacitors.</li> </ol> |
| 14. Trap Coil and Bias Leakage Adjustment | <p>Test Setup:</p> <p>A) Trap coil adjustment</p>    | <p>A) Trap Coil Adjustment</p> <ol style="list-style-type: none"> <li>Set the record volume control (MIC and AUX) counterclockwise to the full.</li> <li>Place the unit in the stereo-record mode.</li> <li>Adjust L507 and L508 so that the VTVM connected between the checking point and ground reads a minimum (less than -10 dB).</li> </ol>   |

| Items                                 | Remarks   | Procedures   |
|---------------------------------------|---|--|
| Trap Coil and Bias Leakage Adjustment | <p>B) Bias leakage adjustment</p>  <p>Specification:</p> <p>Less than -10 dB<br/>(Trap Coil Adjustment)</p> <p>Less than -35 dB<br/>(Bias Leakage Adjustment)</p> <p>Notes:</p> <ol style="list-style-type: none"> <li>Use a non-metallic screwdriver.</li> <li>Do not use shielded wire as the lead of the VTVM.</li> </ol>   | <p>B) Bias Leakage Adjustment</p> <ol style="list-style-type: none"> <li>Set the record volume control (MIC and AUX) clockwise to the full.</li> <li>Place the unit in the stereo-record mode.</li> <li>Set the MONITOR switch to TAPE.</li> <li>Adjust L301 and L401 so that the VTVM reads a minimum (less than -35 dB).</li> <li>Change the MONITOR switch to SOURCE and make sure that the VTVM reads less than -35 dB.</li> </ol> <p>L301 (L-CH forward run)<br/>L401 (R-CH forward run)</p>  |
| 15. Record Level Adjustment           | <p>Test Setup:<br/>Same as Item 13</p> <p>Control/Switch Setting:<br/>Record volume control<br/>..... specified position on page 19<br/>MONITOR switch ..... TAPE</p> <p>Specification:</p> <p>0 ± 1 dB ..... Playback output at 19 cm/s (7-1/2 ips) tape speed</p> <p>0 ± 2 dB ..... Playback output at 9.5 cm/s (3-3/4 ips) and 4.8 cm/s (1-7/8 ips) tape speed</p> <p>* The level difference between channels at 9.5 cm/s and 4.8 cm/s tape speed<br/>..... within 2 dB</p> <p>* The level difference between stereo-record mode and monaural-record mode<br/>..... within 1 dB</p> <p>Note: The adjustment should be performed for both L-CH and R-CH in forward and reverse modes.</p> | <ol style="list-style-type: none"> <li>Deliver a 1 kHz signal of -60 dB (0.775 mV) to the MIC jack.</li> <li>Set the TAPE SPEED switch to 19 cm/s (7-1/2 ips).</li> <li>Place the unit in the stereo-record mode.</li> <li>Adjust R127, R128, R227 and R228 so that the VTVM reads 0 dB (0.775 V).</li> </ol> <p>R127 (L-CH forward run)<br/>R227 (R-CH forward run)<br/>R128 (L-CH reverse run)<br/>R228 (R-CH reverse run)</p> <ol style="list-style-type: none"> <li>When changing the TAPE SPEED switch to 9.5 cm/s (3-3/4 ips) and 4.8 cm/s (1-7/8 ips) make sure that the VTVM reads 0 ± 2 dB and that the difference between L-CH and R-CH is within 2 dB.</li> <li>When changing a mode from stereo to monaural, make sure that difference between them is within 1 dB.</li> </ol> |

| Items                              | Remarks   | Procedures   |
|------------------------------------|---|--|
| 16. Playback S/N Ratio Measurement | <p>Test Setup:</p>  <p>Switch Setting:</p> <p>MONITOR switch ..... TAPE</p> <p>Specification:</p> <p>more than 48 dB in both FWD and REV modes</p>   | <ol style="list-style-type: none"> <li>Play back the 1st tone (400 Hz) of SONY alignment tape (J-19-F2).</li> <li>Note the VTVM reading.</li> <li>Remove the alignment tape.</li> <li>Hold the both actuators so that the shut-off switch is activated (a rubber band or piece of masking tape will hold the actuator as though tape were threaded on the unit).</li> <li>Place the unit in the FWD or REV mode without the tape threaded.</li> <li>Note the VTVM reading.</li> <li>Make sure that the level difference between step (2) and step (6) is more than 48 dB.</li> <li>Reverse the power plug to the AC outlet and repeat the step (1) through the step (6).</li> <li>Make sure that the level difference is also more than 48 dB.</li> </ol>                          |
| 17. Erase Ratio Measurement        | <p>Test Setup:</p>  <p>Control/Switch Setting:</p> <p>*Record volume control ..... specified position on page 19</p> <p>*MONITOR switch ..... TAPE</p> <p>Specification:</p> <p>*Erase ratio ..... more than 60 dB</p> <p>*Level fluctuation width ..... within 5 dB</p> | <ol style="list-style-type: none"> <li>Thread a blank tape.</li> <li>Deliver a 1 kHz signal of -50 dB (2.45 mV) to the MIC jack.</li> <li>Record the signal on the tape, noting where the reading begins for a later reference.</li> <li>Disconnect the audio oscillator.</li> <li>Rewind a half of the recorded tape.</li> <li>Terminate the MIC jack with a 300 Ω resistor.</li> <li>Erase the tape by recording with no input signal.</li> <li>Rewind again to the beginning of the recording.</li> <li>Place the unit in the playback mode.</li> <li>Play back the tape, reading the VTVM, and make sure that the difference between the two parts is more than 60 dB, and that the level fluctuation width is within 5 dB. If not, check the tape path adjustment.</li> </ol> |

| Items  | Remarks  | Procedures  |
|--|--|---|
| 18. Crosstalk Measurement (between tracks)   | <p>Test Setup:</p>  <p>Control/Switch Setting:</p> <ul style="list-style-type: none"> <li>*Record volume control ..... specified position on page 19</li> <li>*MONITOR switch ..... TAPE</li> </ul> <p>Specification:</p> <p>more than 60 dB</p> <p>Note: Use a well-demagnetized tape or a new tape.</p> | <ol style="list-style-type: none"> <li>(1) Deliver a 1 kHz signal of -50 dB (2.45 mV) to the MIC jack.</li> <li>(2) Record the signal on the tape in the stereo record mode.</li> <li>(3) Note the VTVM reading.</li> <li>(4) Invert and reverse the reels.</li> <li>(5) Play back the tape.</li> <li>(6) Measure the VTVM reading at both L-CH and R-CH LINE OUT puts.</li> <li>(7) Make sure that the difference between the step (3) and the step (6) is more than 60 dB.</li> </ol>  |
| 19. Crosstalk Measurement (between channels) | <p>Test Setup:</p>  <p>Control/Switch Setting:</p> <p>Same as Item 18</p> <p>Specification:</p> <p>more than 45 dB</p> <p>Note: Use a well-demagnetized tape or a new tape.</p>  | <ol style="list-style-type: none"> <li>(1) Thread a blank tape.</li> <li>(2) Terminate the R-CH (L-CH) MIC jack with a 300 Ω resistor.</li> <li>(3) Deliver a 1 kHz signal of -50 dB (2.45 mV) to the L-CH (R-CH) MIC jack.</li> <li>(4) Place the unit in the stereo-record mode.</li> <li>(5) Make sure that the level difference between L-CH and R-CH is more than 45 dB.</li> </ol>  |

| Items                                      | Remarks  | Procedures   |                      |          |          |       |            |                      |                      |        |            |            |            |       |            |            |                      |       |            |            |   |        |   |                      |   |          |            |                       |   |        |                                |   |   |  |                       |   |   |  |
|--|--|--|----------------------|----------|----------|-------|------------|----------------------|----------------------|--------|------------|------------|------------|-------|------------|------------|----------------------|-------|------------|------------|---|--------|---|----------------------|---|----------|------------|-----------------------|---|--------|--------------------------------|---|---|--|-----------------------|---|---|--|
| 20. Overall Frequency Response Measurement | <p>Test Setup:</p> <p>Control/Switch Setting:</p> <p>*Record volume control ..... specified position on page 19</p> <p>*MONITOR switch ..... TAPE</p> <p>*TAPE SELECT switch ..... SPECIAL (with a SONY SLH tape)</p> <p>..... NORMAL (with a standard tape)</p> <p>Specification:</p> <table border="1"> <thead> <tr> <th>speed<br/>freq.</th><th>19 cm/s</th><th>9.5 cm/s</th><th>4.8 cm/s</th></tr> </thead> <tbody> <tr> <td>50 Hz</td><td><math>\pm 3</math> dB</td><td><math>\pm \frac{1}{2}</math> dB</td><td><math>\pm \frac{1}{3}</math> dB</td></tr> <tr> <td>100 Hz</td><td><math>\pm 3</math> dB</td><td><math>\pm 3</math> dB</td><td><math>\pm 3</math> dB</td></tr> <tr> <td>5 kHz</td><td><math>\pm 3</math> dB</td><td><math>\pm 3</math> dB</td><td><math>\pm \frac{1}{2}</math> dB</td></tr> <tr> <td>7 kHz</td><td><math>\pm 3</math> dB</td><td><math>\pm 3</math> dB</td><td>—</td></tr> <tr> <td>10 kHz</td><td>—</td><td><math>\pm \frac{1}{2}</math> dB</td><td>—</td></tr> <tr> <td>12.5 kHz</td><td><math>\pm 3</math> dB</td><td><math>\pm \frac{1}{10}</math> dB</td><td>—</td></tr> <tr> <td>18 kHz</td><td>NORMAL<br/><math>\pm \frac{1}{2}</math> dB</td><td>—</td><td>—</td></tr> <tr> <td></td><td>SPECIAL<br/><math>\pm 3</math> dB</td><td>—</td><td>—</td></tr> </tbody> </table> | speed<br>freq.   | 19 cm/s              | 9.5 cm/s | 4.8 cm/s | 50 Hz | $\pm 3$ dB | $\pm \frac{1}{2}$ dB | $\pm \frac{1}{3}$ dB | 100 Hz | $\pm 3$ dB | $\pm 3$ dB | $\pm 3$ dB | 5 kHz | $\pm 3$ dB | $\pm 3$ dB | $\pm \frac{1}{2}$ dB | 7 kHz | $\pm 3$ dB | $\pm 3$ dB | — | 10 kHz | — | $\pm \frac{1}{2}$ dB | — | 12.5 kHz | $\pm 3$ dB | $\pm \frac{1}{10}$ dB | — | 18 kHz | NORMAL<br>$\pm \frac{1}{2}$ dB | — | — |  | SPECIAL<br>$\pm 3$ dB | — | — | <ol style="list-style-type: none"> <li>Set the TAPE SPEED switch to 19 cm/s (7-1/2 ips).</li> <li>Thread a blank tape.</li> <li>Deliver a 1 kHz signal of -80 dB (77.5 <math>\mu</math>V) to the MIC jack.</li> <li>Place the unit in the record mode.</li> <li>Note the VTVM reading.</li> <li>Change the frequency of an audio oscillator to 50 Hz, 100 Hz, 5 kHz, 7 kHz, 10 kHz, 12.5 kHz and 18 kHz in order and note the VTVM reading.</li> <li>Make sure that the level deviation of each frequency against 1 kHz signal is within the range specified.</li> <li>Repeat the above steps (3) through (7) at the tape speed of 9.5 cm/s (3 3/4 ips) and 4.8 cm/s (1 7/8 ips).</li> </ol> |
| speed<br>freq.                             | 19 cm/s  | 9.5 cm/s   | 4.8 cm/s             |          |          |       |            |                      |                      |        |            |            |            |       |            |            |                      |       |            |            |   |        |   |                      |   |          |            |                       |   |        |                                |   |   |  |                       |   |   |  |
| 50 Hz                                      | $\pm 3$ dB   | $\pm \frac{1}{2}$ dB   | $\pm \frac{1}{3}$ dB |          |          |       |            |                      |                      |        |            |            |            |       |            |            |                      |       |            |            |   |        |   |                      |   |          |            |                       |   |        |                                |   |   |  |                       |   |   |  |
| 100 Hz                                     | $\pm 3$ dB   | $\pm 3$ dB   | $\pm 3$ dB           |          |          |       |            |                      |                      |        |            |            |            |       |            |            |                      |       |            |            |   |        |   |                      |   |          |            |                       |   |        |                                |   |   |  |                       |   |   |  |
| 5 kHz                                      | $\pm 3$ dB   | $\pm 3$ dB   | $\pm \frac{1}{2}$ dB |          |          |       |            |                      |                      |        |            |            |            |       |            |            |                      |       |            |            |   |        |   |                      |   |          |            |                       |   |        |                                |   |   |  |                       |   |   |  |
| 7 kHz                                      | $\pm 3$ dB   | $\pm 3$ dB   | —                    |          |          |       |            |                      |                      |        |            |            |            |       |            |            |                      |       |            |            |   |        |   |                      |   |          |            |                       |   |        |                                |   |   |  |                       |   |   |  |
| 10 kHz                                     | —  | $\pm \frac{1}{2}$ dB   | —                    |          |          |       |            |                      |                      |        |            |            |            |       |            |            |                      |       |            |            |   |        |   |                      |   |          |            |                       |   |        |                                |   |   |  |                       |   |   |  |
| 12.5 kHz                                   | $\pm 3$ dB   | $\pm \frac{1}{10}$ dB  | —                    |          |          |       |            |                      |                      |        |            |            |            |       |            |            |                      |       |            |            |   |        |   |                      |   |          |            |                       |   |        |                                |   |   |  |                       |   |   |  |
| 18 kHz                                     | NORMAL<br>$\pm \frac{1}{2}$ dB   | —  | —                    |          |          |       |            |                      |                      |        |            |            |            |       |            |            |                      |       |            |            |   |        |   |                      |   |          |            |                       |   |        |                                |   |   |  |                       |   |   |  |
|  | SPECIAL<br>$\pm 3$ dB  | —  | —                    |          |          |       |            |                      |                      |        |            |            |            |       |            |            |                      |       |            |            |   |        |   |                      |   |          |            |                       |   |        |                                |   |   |  |                       |   |   |  |
| 21. Overall S/N Ratio Measurement          | <p>Test Setup:</p> <p>Control/Switch Setting:</p> <p>*Record volume control ..... specified position on page 19</p> <p>*MONITOR switch ..... TAPE</p>  | <ol style="list-style-type: none"> <li>Thread a blank tape.</li> <li>Deliver a 1 kHz signal of -60 dB (0.775 mV) to the MIC jack.</li> <li>Place the unit in the record mode.</li> <li>Record the signal on the tape, noting where the recording begins for a later reference.</li> <li>Disconnect the audio oscillator.</li> <li>Rewind a half of the recorded tape.</li> <li>Terminate the MIC jack with a 300 <math>\Omega</math> resistor.</li> <li>Place the unit in the record mode with no input signal.</li> <li>Make sure that the difference between two parts is within the specification.</li> </ol> |                      |          |          |       |            |                      |                      |        |            |            |            |       |            |            |                      |       |            |            |   |        |   |                      |   |          |            |                       |   |        |                                |   |   |  |                       |   |   |  |

| Items                              | Remarks  | Procedures   |
|------------------------------------|--|--|
| Overall S/N Ratio Measurement      | <p>Specification:</p> <p>*more than 45 dB at 19 cm/s tape speed</p> <p>*more than 41 dB at both 9.5 cm/s and 4.8 cm/s tape speed.</p>  |  |
| 22. Overall Distortion Measurement | <p>Test Setup:</p> <p>Control/Switch Setting:</p> <p>*Record volume control ..... specified position on page 19</p> <p>*MONITOR switch ..... TAPE</p> <p>Specification:</p> <p>less than 1 %</p> | <ol style="list-style-type: none"> <li>Thread a blank tape.</li> <li>Deliver a 1 kHz signal of -60 dB (0.775 mV) to the MIC jack.</li> <li>Place the unit in the record mode.</li> <li>Make sure that the distortion meter reads less than 1 %.</li> </ol> |


## DIAGRAMS

#### 4-1. SCHEMATIC DIAGRAM

#### 4-1-1. Audio Amp. and Bias OSC Circuit

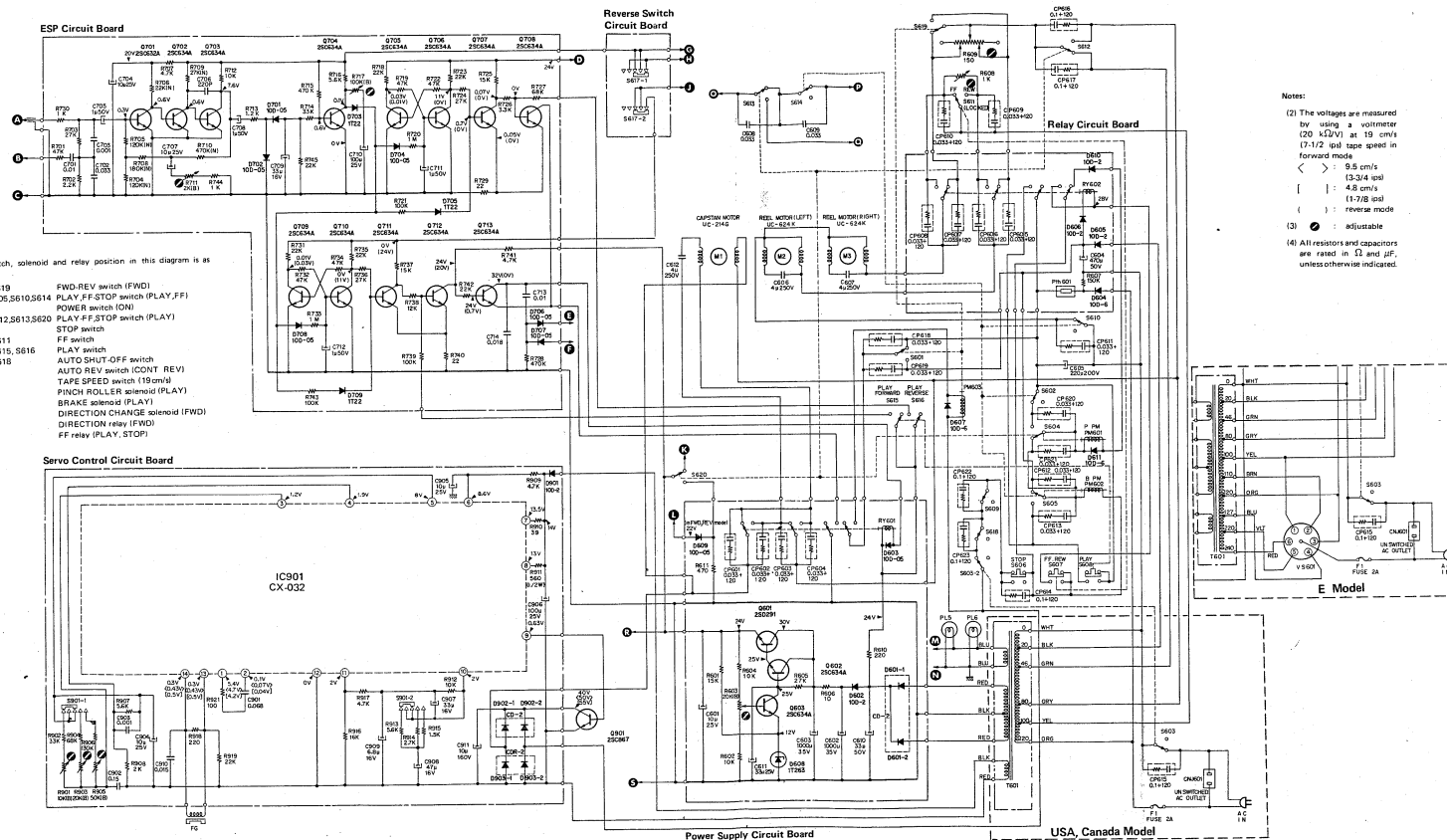


Notes:

- (1) The switch position in this diagram is as follows:
- |                |                             |
|----------------|-----------------------------|
| S101 - (1) ← 8 | FWD-REV switch (1) (FWD)    |
| S102 - (1) ← 9 | FWD-REV switch (2) (FWD)    |
| S103 - (1) ← 8 | LCH REC switch (OFF)        |
| S104 - (1) ← 9 | LCH REC switch (ON)         |
| S105 - (1) ← 2 | LCH MONITOR switch (TAPE)   |
| S106 - (1) ← 2 | RCH MONITOR switch (TAPE)   |
| S107 - (1) ← 6 | EQUALIZER switch (LEVEL)    |
| S108 - (1) ← 6 | TAPE SELECT switch (NORMAL) |
| S109 - (1) ← 2 | HEADPHONE Switch (LOW)      |
- (2) Voltages are measured by using a voltmeter (20 kΩ/V) with no input signal at 10 cm/s tape speed in playback mode.  
Voltages [ ] are measured in record mode.
- (3) All resistors and capacitors are rated in Ω and μF, unless other value indicated.
- (4)  : adjustable



#### 4-1-2. System Control Circuit

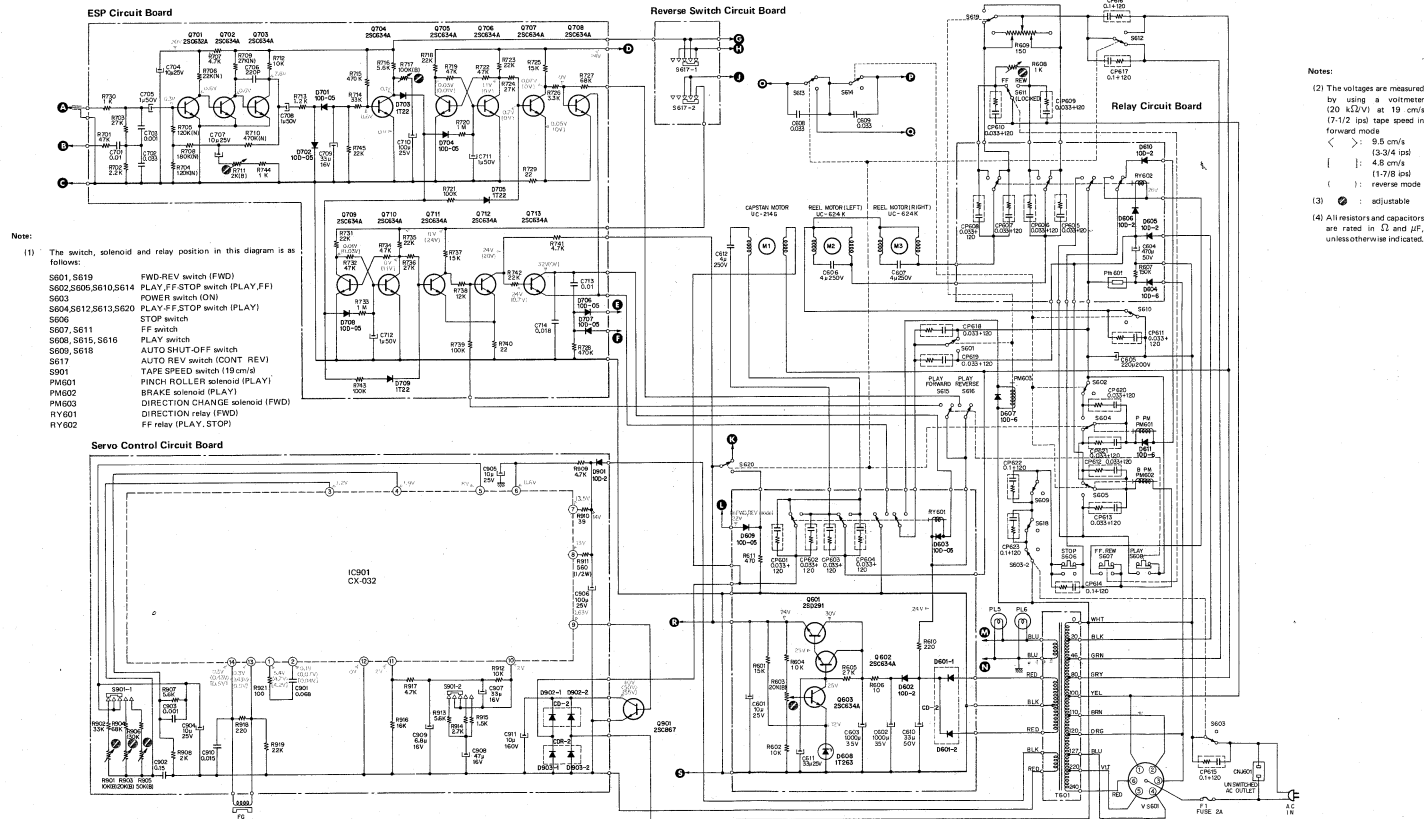


35 A

36 A



# 4-1-2. System Control Circuit

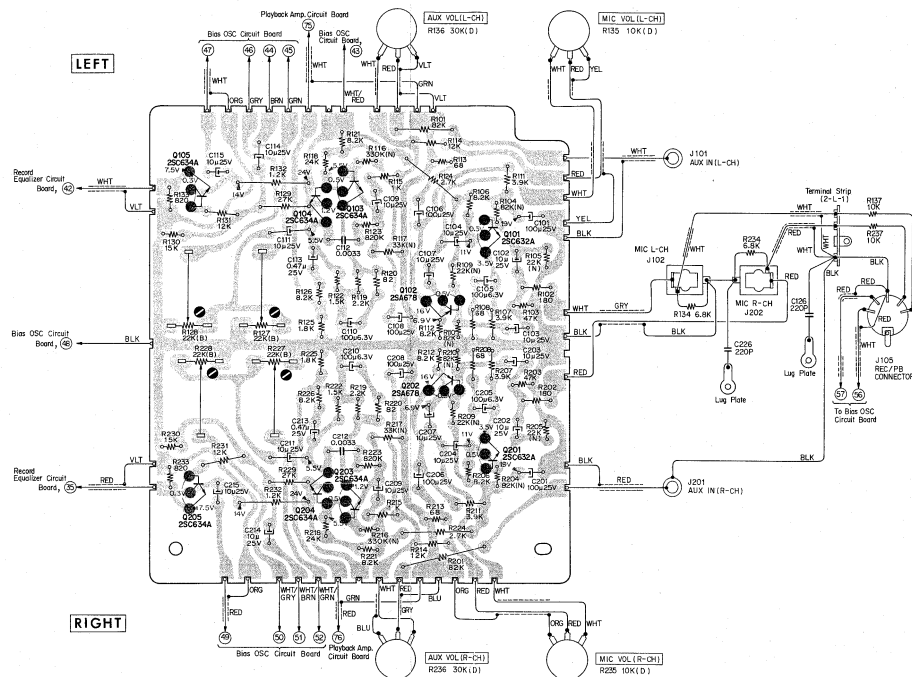


- Notes:
- (1) The voltages are measured by using a voltmeter (20 k $\Omega$ /V) at 19 cm/s (17-1/2 ips) tape speed in forward mode.
    - < 9.5 cm/s
    - > 13-3/4 ips
    - 4.8 cm/s
    - (1-7/8 ips)
    - ( ) : reverse mode
  - (2) : adjustable
  - (3) All resistors and capacitors are rated in  $\Omega$  and  $\mu$ F, unless otherwise indicated.

## 4-2. MOUNTING DIAGRAM

### 4-2.1. Record Amp. Circuit Board

— Conductor Side —

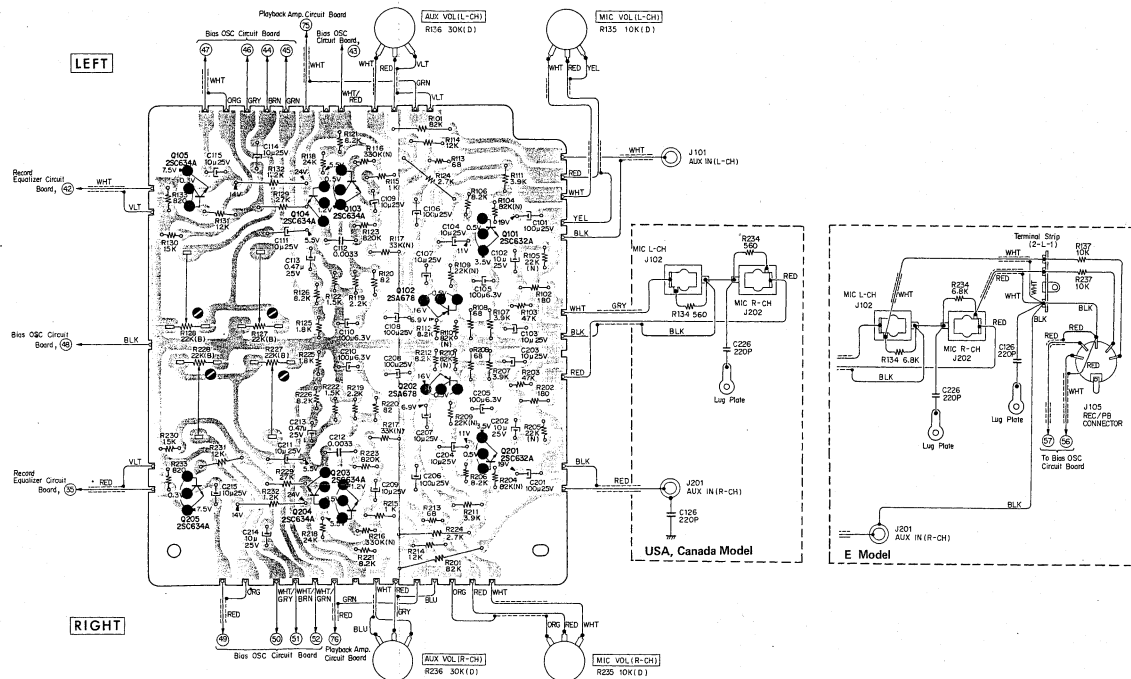


Printed Circuit Board  
Part No. 1-581-040-11

## 4.2. MOUNTING DIAGRAM

### 4.2-1. Record Amp. Circuit Board

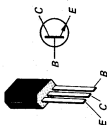
— Conductor Side —



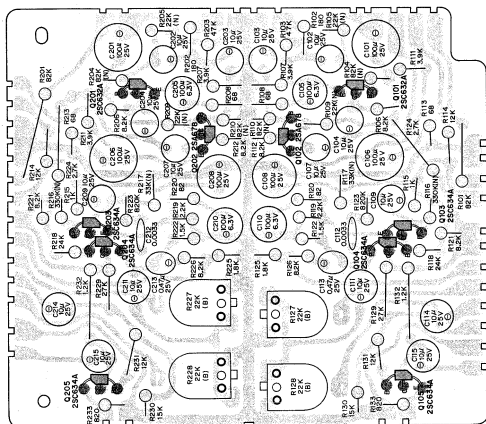
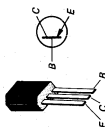
Printed Circuit Board  
Part No. 1-581-040-11

— Component Side —

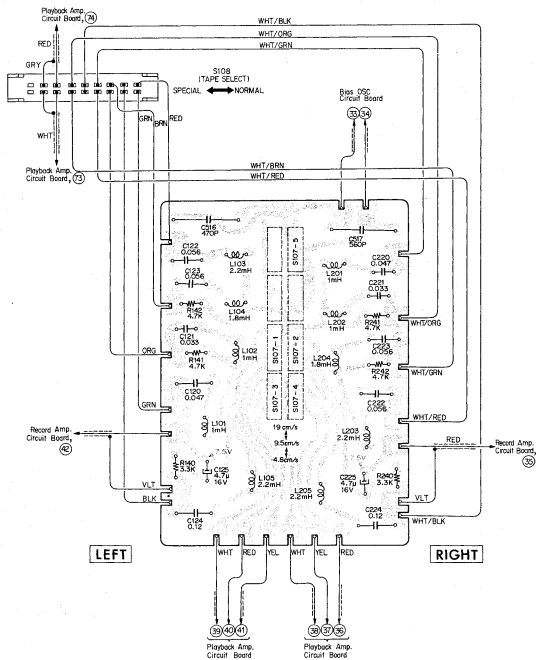
25C632A, 25C634A



25A678

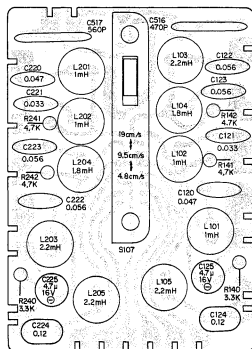


4-2.2. Record Equalizer Circuit Board  
— Conductor Side —



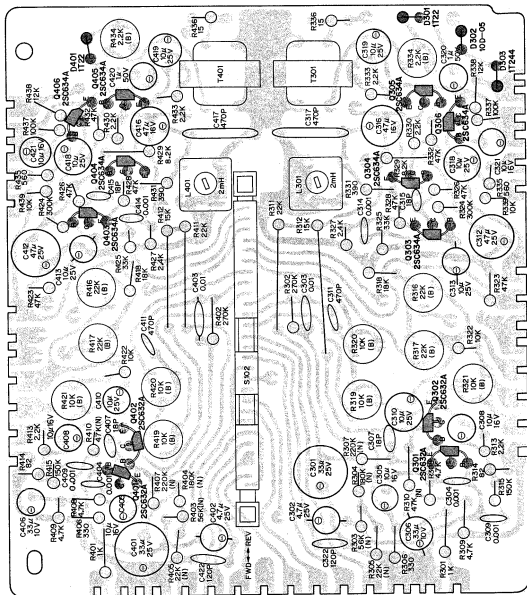
Printed Circuit Board  
Part No. 1-581-041-11

— Component Side —

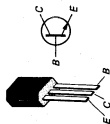




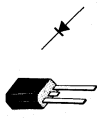
4-2.3. Playback Amp. Circuit Board  
— Component Side —



25C632A, 25C634A



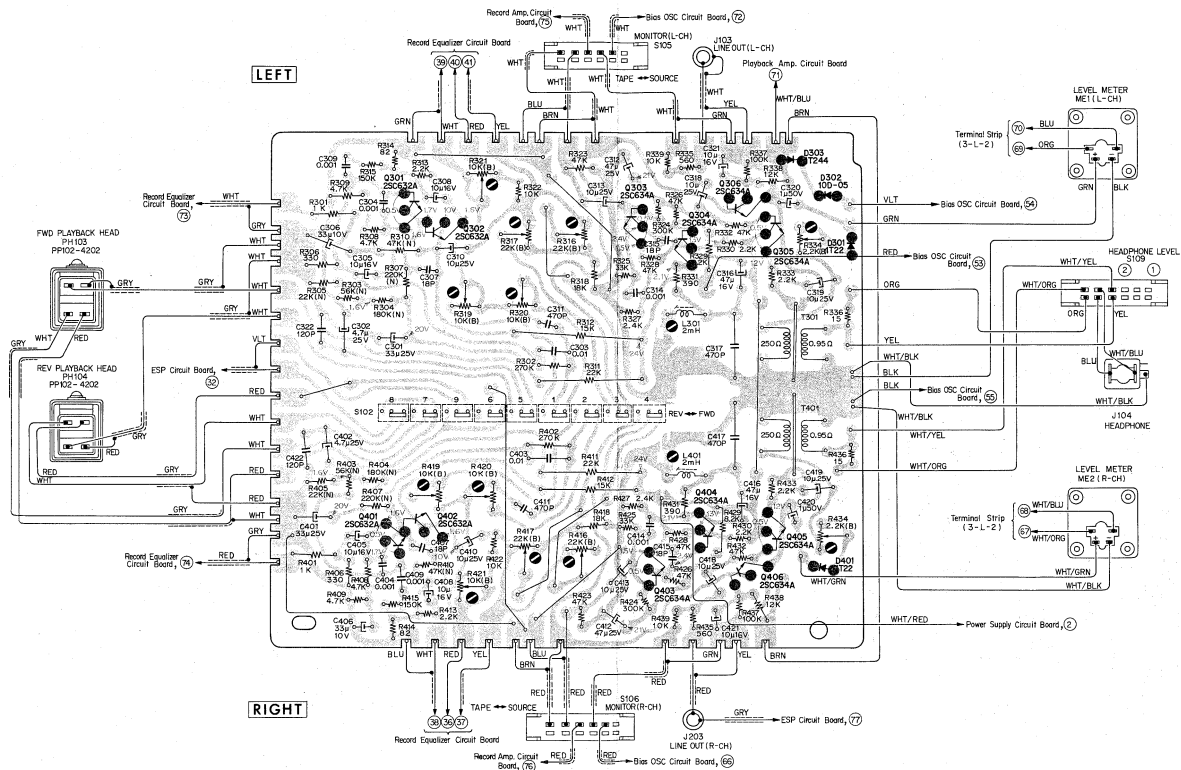
1T244



1T22, 10D-05

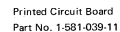


— Conductor Side —

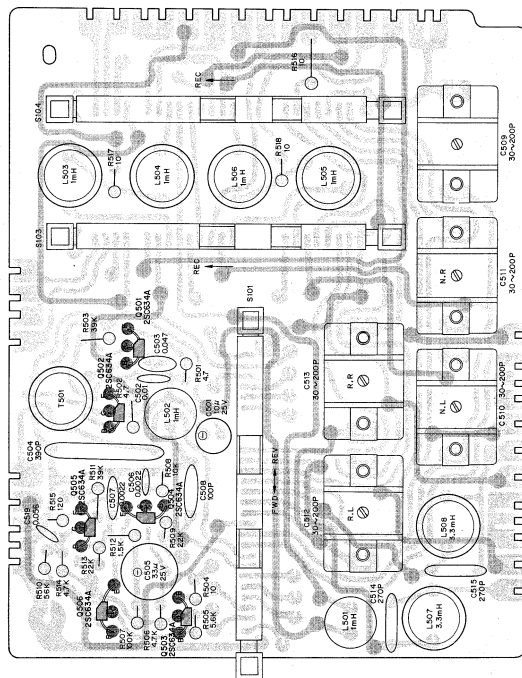


Printed Circuit Board  
Part No. 1-581-038-11

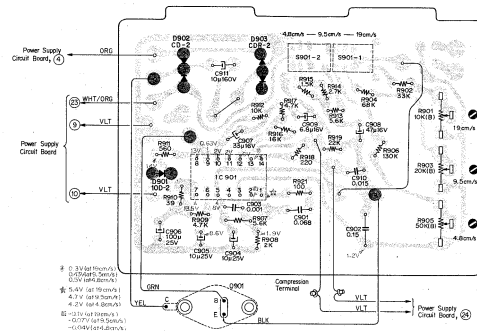
— Conductor Side —



— Component Side —

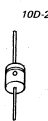
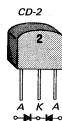
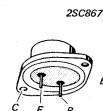
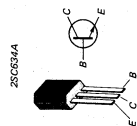
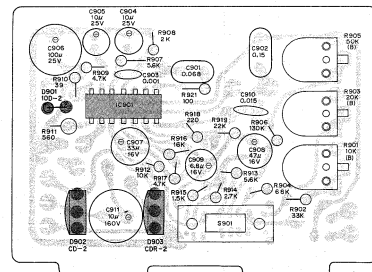


#### 4-2-5. Servo Control Circuit Board — Conductor Side —



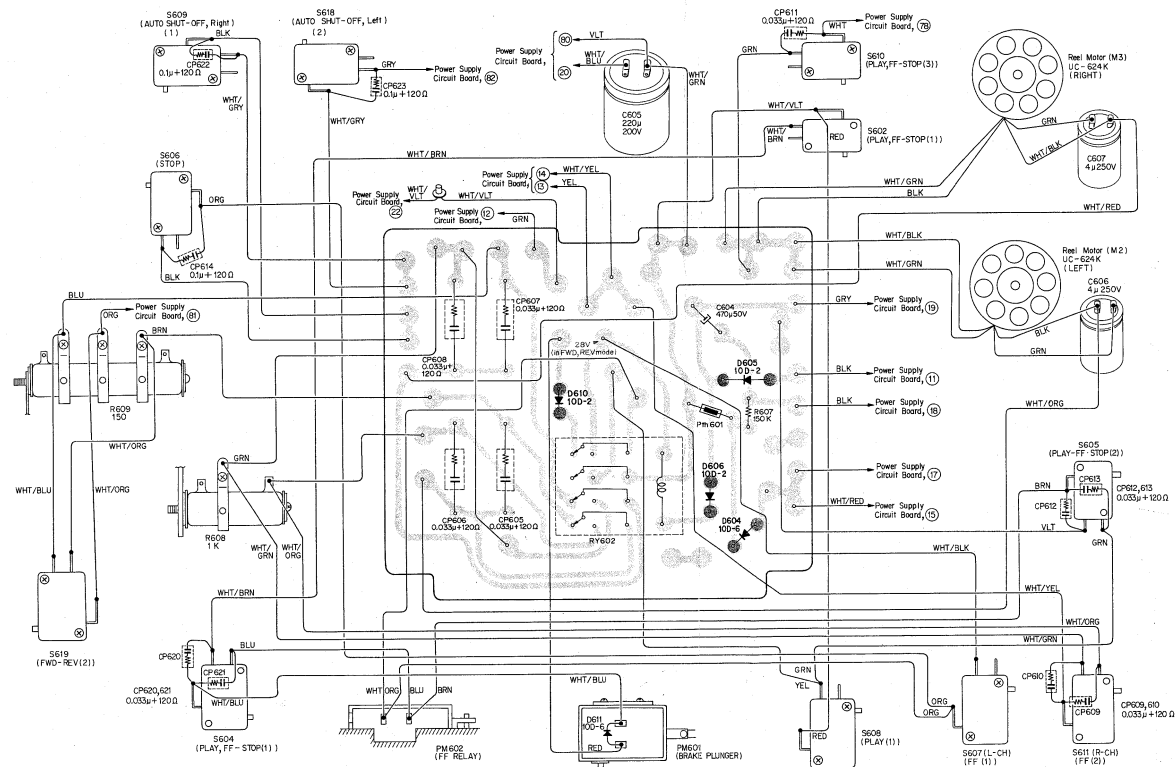
Printed Circuit Board  
Part No. 1-581-005-12

— Component Side —



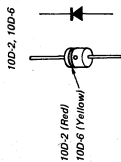
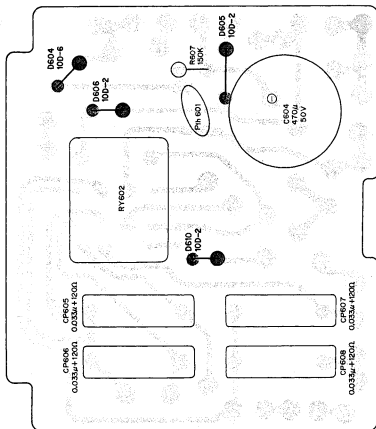
#### 4-2-6. Relay Circuit Board

— Conductor Side —

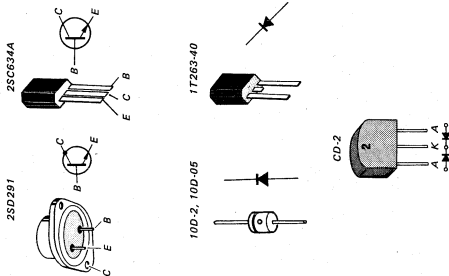
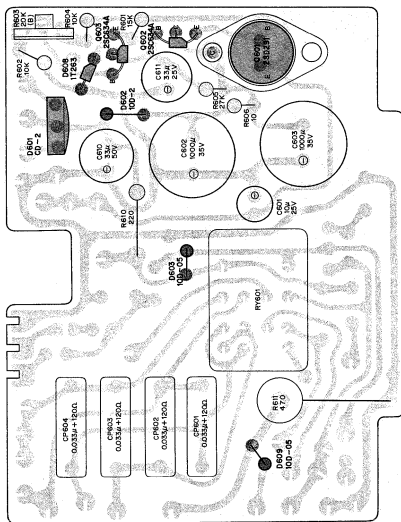


Printed Circuit Board  
Part No. 1-581-044-12

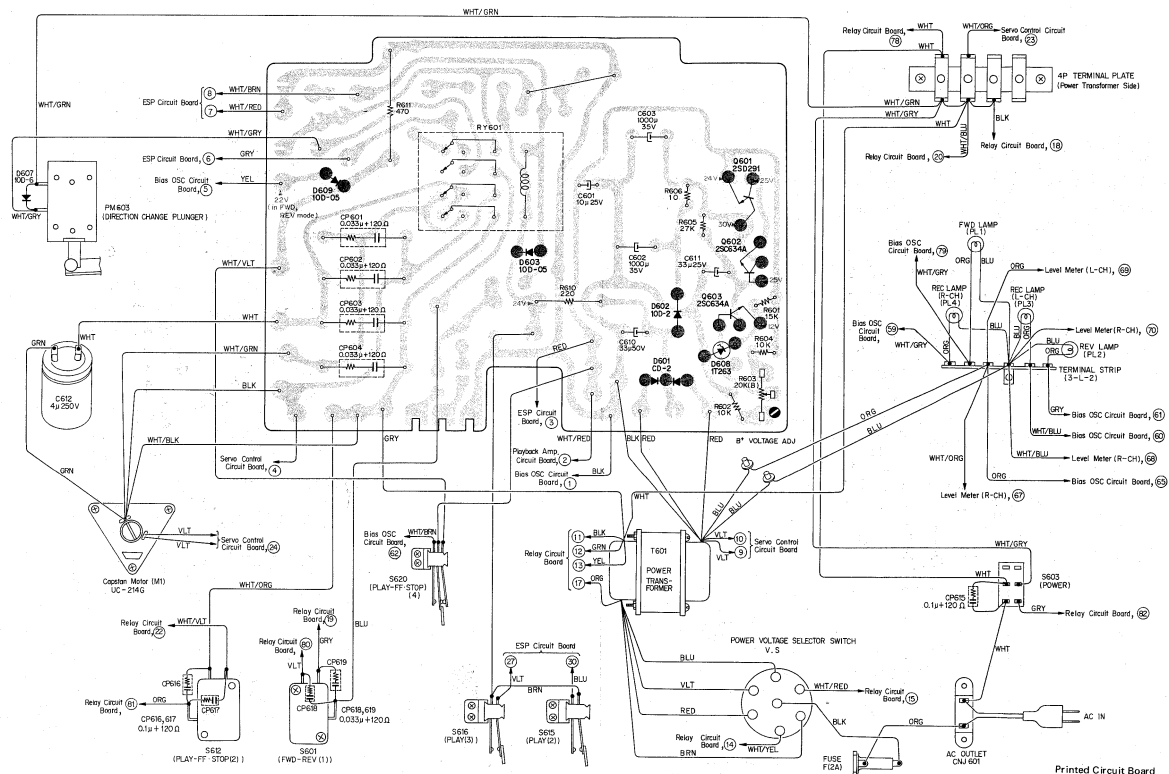
— Component Side —



4-2-7. Power Supply Circuit Board  
— Component Side —



— Conductor Side —

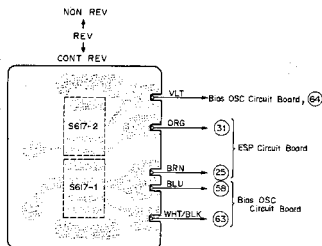


Printed Circuit Board  
Part No. 1-581-043-12



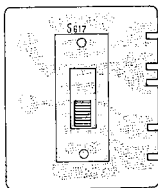


4-2-9. Reverse Switch Circuit Board  
— Conductor Side —



Printed Circuit Board  
Part No. 1-581-045-11

— Component Side —





# SECTION 5

## ELECTRICAL PARTS LIST

Ref. No.    Part No.    Description

### MOUNTED CIRCUIT BOARDS

X-34970-61    record amp  
X-34970-62    record equalizer  
X-34970-63    playback amp  
X-34970-64    bias osc  
X-34970-65    power supply  
X-34970-66    relay  
X-34970-67    ESP  
X-34970-68    servo control  
X-34970-69    reverse switch

### PRINTED CIRCUIT BOARDS

1-581-005    servo control  
1-581-038    playback amp  
1-581-039    bias osc  
1-581-040    record amp  
1-581-041    record equalizer  
1-581-042    ESP  
1-581-043    power supply  
1-581-044    relay  
1-581-045    reverse switch

### REC AMP CIRCUIT

#### SEMICONDUCTORS

Q101, 201    transistor,    2SC632A  
Q102, 202    transistor,    2SA678  
Q103, 203    transistor,    2SC634A  
Q104, 204    transistor,    2SC634A  
Q105, 205    transistor,    2SC634A

#### CAPACITORS

C101, 201    1-121-416    100  $\mu$ F    25 V    electrolytic  
C102, 202    1-121-398    10  $\mu$ F    25 V    electrolytic  
C103, 203    1-121-398    10  $\mu$ F    25 V    electrolytic  
C104, 204    1-121-398    10  $\mu$ F    25 V    electrolytic  
C105, 205    1-121-413    100  $\mu$ F    6.3 V    electrolytic  
C106, 206    1-121-416    100  $\mu$ F    25 V    electrolytic  
C107, 207    1-121-398    10  $\mu$ F    25 V    electrolytic  
C108, 208    1-121-416    100  $\mu$ F    25 V    electrolytic  
C109, 209    1-121-398    10  $\mu$ F    25 V    electrolytic  
C110, 210    1-121-413    100  $\mu$ F    6.3 V    electrolytic  
C111, 211    1-121-398    10  $\mu$ F    25 V    electrolytic  
C112, 212    1-105-667-12    0.0033  $\mu$ F    50 V    mylar  
C113, 213    1-127-093    0.47  $\mu$ F    25 V    electrolytic, alox  
C114, 214    1-121-398    10  $\mu$ F    25 V    electrolytic  
C115, 215    1-121-398    10  $\mu$ F    25 V    electrolytic

Ref. No.    Part No.    Description

### RESISTORS

All resistors are  $\frac{1}{4}$  W and carbon type, unless otherwise indicated.

R101, 201    1-242-719    82 k $\Omega$   
R102, 202    1-242-655    180  $\Omega$   
R103, 203    1-242-713    47 k $\Omega$   
R104, 204    1-242-719-09    82 k $\Omega$     low noise  
R105, 205    1-242-705-09    22 k $\Omega$     low noise  
R106, 206    1-242-695    8.2 k $\Omega$   
R107, 207    1-242-687    3.9 k $\Omega$   
R108, 208    1-242-645    68  $\Omega$   
R109, 209    1-242-705-09    22 k $\Omega$     low noise  
R110, 210    1-242-719-09    82 k $\Omega$     low noise  
R111, 211    1-242-687    3.9 k $\Omega$   
R112, 212    1-242-695    8.2 k $\Omega$   
R113, 213    1-242-645    68  $\Omega$   
R114, 214    1-242-699    12 k $\Omega$   
R115, 215    1-242-673    1 k $\Omega$   
R116, 216    1-242-733-09    330 k $\Omega$     low noise  
R117, 217    1-242-709-09    33 k $\Omega$     low noise  
R118, 218    1-242-706    24 k $\Omega$   
R119, 219    1-242-681    2.2 k $\Omega$   
R120, 220    1-242-647    82  $\Omega$   
R121, 221    1-242-695    8.2 k $\Omega$   
R122, 222    1-242-677    1.5 k $\Omega$   
R123, 223    1-242-743    820 k $\Omega$   
R124, 224    1-242-683    2.7 k $\Omega$   
R125, 225    1-242-679    1.8 k $\Omega$   
R126, 226    1-242-695    8.2 k $\Omega$   
R127, 227    1-223-775    22 k $\Omega$  (B)    semi-fixed  
R128, 228    1-222-775    22 k $\Omega$  (B)    semi-fixed  
R129, 229    1-242-707-09    27 k $\Omega$     low noise  
R130, 230    1-242-701    15 k $\Omega$   
R131, 231    1-242-699    12 k $\Omega$   
R132, 232    1-242-675    1.2 k $\Omega$   
R133, 233    1-242-671    820  $\Omega$   
R134, 234    1-244-693    6.8 k $\Omega$

### REC EQUALIZER CIRCUIT

#### MICROINDUCTORS

L101, 201    1-407-492    1 mH  
L102, 202    1-407-492    1 mH  
L103, 203    1-407-496    2.2 mH  
L104, 204    1-407-495    1.8 mH  
L105, 205    1-407-496    2.2 mH

Ref. No.      Part No.      Description

**CAPACITORS**

|           |              |               |      |              |
|-----------|--------------|---------------|------|--------------|
| C120, 220 | 1-106-041-12 | 0.047 $\mu$ F | 50 V | mylar        |
| C121, 221 | 1-106-037-12 | 0.033 $\mu$ F | 50 V | mylar        |
| C122, 222 | 1-105-682-12 | 0.056 $\mu$ F | 50 V | mylar        |
| C123, 223 | 1-105-682-12 | 0.056 $\mu$ F | 50 V | mylar        |
| C124, 224 | 1-105-686-12 | 0.12 $\mu$ F  | 50 V | mylar        |
| C125, 225 | 1-121-395    | 4.7 $\mu$ F   | 25 V | electrolytic |

**RESISTORS**

|           |           |                |                 |        |
|-----------|-----------|----------------|-----------------|--------|
| R140, 240 | 1-242-685 | 3.3 k $\Omega$ | $\frac{1}{4}$ W | carbon |
| R141, 241 | 1-242-689 | 4.7 k $\Omega$ | $\frac{1}{4}$ W | carbon |
| R142, 242 | 1-242-689 | 4.7 k $\Omega$ | $\frac{1}{4}$ W | carbon |

**SWITCH**

|      |           |        |           |
|------|-----------|--------|-----------|
| S107 | 1-514-634 | slide; | EQUALIZER |
|------|-----------|--------|-----------|

**AMP CHASSIS CIRCUIT**

**CAPACITORS**

|           |           |        |      |               |
|-----------|-----------|--------|------|---------------|
| C126, 226 | 1-107-139 | 220 pF | 50 V | silvered mica |
|-----------|-----------|--------|------|---------------|

**RESISTORS**

|           |           |                   |                        |
|-----------|-----------|-------------------|------------------------|
| R135, 235 | 1-222-498 | 10 k $\Omega$ (D) | variable, MIC          |
| R136, 236 | 1-222-497 | 30 k $\Omega$ (B) | variable, AUX          |
| R137, 237 | 1-244-697 | 10 k $\Omega$     | $\frac{1}{4}$ W carbon |

**JACKS**

|           |           |            |           |
|-----------|-----------|------------|-----------|
| J101, 201 | 1-507-142 | phono;     | AUX IN    |
| J102, 202 | 1-507-281 |            | MIC       |
| J103, 203 | 1-507-142 | phono;     | LINE OUT  |
| J104      | 1-507-282 | binaural;  | HEADPHONE |
| J105      | 1-509-359 | connector; | REC/PB    |

**SWITCHES**

|      |           |              |                       |
|------|-----------|--------------|-----------------------|
| S105 | 1-514-836 | lever;       | MONITOR               |
| S106 | 1-514-836 | lever;       | MONITOR               |
| S107 |           | described in | REC EQUALIZER CIRCUIT |
| S108 | 1-514-867 | lever;       | TAPE SELECT           |
| S109 | 1-514-768 | lever;       | HEADPHONE LEVEL       |

**MISCELLANEOUS**

|        |              |           |
|--------|--------------|-----------|
| PL3, 4 | 1-518-093-21 | lamp, 2 V |
| ME1, 2 | 1-524-082-11 | meter, VU |

Ref. No.      Part No.      Description

**HEAD DECK CIRCUIT**

|             |              |                                    |
|-------------|--------------|------------------------------------|
| ERH101, 102 | 8-828-629-20 | head, record/erase (ERP102 - 2902) |
| PH103, 104  | 8-829-142-20 | head, playback (PP102 - 4202)      |
| PL1, 2      | 1-518-093-21 | lamp, 2 V                          |

**PLAYBACK AMP CIRCUIT**

**SEMICONDUCTORS**

|           |            |          |
|-----------|------------|----------|
| Q301, 401 | transistor | 2SC632A  |
| Q302, 402 | transistor | 2SC632A  |
| Q303, 403 | transistor | 2SC634A  |
| Q304, 404 | transistor | 2SC634A  |
| Q305, 405 | transistor | 2SC634A  |
| Q306, 406 | transistor | 2SC634A  |
| D301, 401 | diode      | 1T-22    |
| D302      | diode      | 10D-05   |
| D303      | diode      | 1T244 47 |

**COIL & TRANSFORMER**

|           |           |                     |
|-----------|-----------|---------------------|
| L301, 401 | 1-409-130 | coil, trap, 2 mH    |
| T301, 401 | 1-427-209 | transformer, output |

**CAPACITORS**

|           |              |               |      |               |
|-----------|--------------|---------------|------|---------------|
| C301, 401 | 1-121-404    | 33 $\mu$ F    | 25 V | electrolytic  |
| C302, 402 | 1-121-395    | 4.7 $\mu$ F   | 25 V | electrolytic  |
| C303, 403 | 1-105-833-12 | 0.01 $\mu$ F  | 50 V | mylar         |
| C304, 404 | 1-105-821-12 | 0.001 $\mu$ F | 50 V | mylar         |
| C305, 405 | 1-121-471    | 10 $\mu$ F    | 16 V | electrolytic  |
| C306, 406 | 1-121-402    | 33 $\mu$ F    | 10 V | electrolytic  |
| C307, 407 | 1-107-113    | 18 pF         | 50 V | silvered mica |
| C308, 408 | 1-121-471    | 10 $\mu$ F    | 16 V | electrolytic  |
| C309, 409 | 1-105-821-12 | 0.001 $\mu$ F | 50 V | mylar         |
| C310, 410 | 1-121-398    | 10 $\mu$ F    | 25 V | electrolytic  |
| C311, 411 | 1-102-098    | 470 pF        | 50 V | ceramic       |
| C312, 412 | 1-121-410    | 47 $\mu$ F    | 25 V | electrolytic  |
| C313, 413 | 1-121-398    | 10 $\mu$ F    | 25 V | electrolytic  |
| C314, 414 | 1-105-821-12 | 0.001 $\mu$ F | 50 V | mylar         |
| C315, 415 | 1-107-113    | 18 pF         | 50 V | silvered mica |
| C316, 416 | 1-121-409    | 47 $\mu$ F    | 16 V | electrolytic  |
| C317, 417 | 1-107-244    | 470 pF        | 50 V | silvered mica |
| C318, 418 | 1-121-398    | 10 $\mu$ F    | 25 V | electrolytic  |
| C319, 419 | 1-121-398    | 10 $\mu$ F    | 25 V | electrolytic  |
| C320, 420 | 1-121-391    | 1 $\mu$ F     | 50 V | electrolytic  |
| C321, 421 | 1-121-471    | 10 $\mu$ F    | 16 V | electrolytic  |
| C322, 422 | 1-107-133    | 120 pF        | 50 V | silvered mica |

Ref. No.   Part No.   Description

### RESISTORS

All resistors are  $\frac{1}{4}$  W and carbon type, unless otherwise indicated.

|           |              |                    |            |
|-----------|--------------|--------------------|------------|
| R301, 401 | 1-242-673    | 1 k $\Omega$       |            |
| R302, 402 | 1-242-731    | 270 k $\Omega$     |            |
| R303, 403 | 1-242-715-09 | 56 k $\Omega$      | low noise  |
| R304, 404 | 1-242-727-09 | 180 k $\Omega$     | low noise  |
| R305, 405 | 1-242-705    | 22 k $\Omega$      |            |
| R306, 406 | 1-242-661    | 330 $\Omega$       |            |
| R307, 407 | 1-242-729-09 | 220 k $\Omega$     | low noise  |
| R308, 408 | 1-242-689    | 4.7 k $\Omega$     |            |
| R309, 409 | 1-242-689    | 4.7 k $\Omega$     |            |
| R310, 410 | 1-242-713-09 | 47 k $\Omega$      | low noise  |
| R311, 411 | 1-242-705    | 22 k $\Omega$      |            |
| R312, 412 | 1-242-701    | 15 k $\Omega$      |            |
| R313, 413 | 1-242-681    | 2.2 k $\Omega$     |            |
| R314, 414 | 1-242-647    | 82 $\Omega$        |            |
| R315, 415 | 1-242-725    | 150 k $\Omega$     |            |
| R316, 416 | 1-221-979    | 22 k $\Omega$ (B)  | semi-fixed |
| R317, 417 | 1-221-979    | 22 k $\Omega$ (B)  | semi-fixed |
| R318, 418 | 1-242-703    | 18 k $\Omega$      |            |
| R319, 419 | 1-222-701    | 10 k $\Omega$ (B)  | semi-fixed |
| R320, 420 | 1-222-701    | 10 k $\Omega$ (B)  | semi-fixed |
| R321, 421 | 1-222-701    | 10 k $\Omega$ (B)  | semi-fixed |
| R322, 422 | 1-242-697    | 10 k $\Omega$      |            |
| R323, 423 | 1-242-713    | 47 k $\Omega$      |            |
| R324, 424 | 1-242-732    | 300 k $\Omega$     |            |
| R325, 425 | 1-242-709    | 33 k $\Omega$      |            |
| R326, 426 | 1-242-713    | 47 k $\Omega$      |            |
| R327, 427 | 1-242-682    | 2.4 k $\Omega$     |            |
| R328, 428 | 1-242-713    | 47 k $\Omega$      |            |
| R329, 429 | 1-242-695    | 8.2 k $\Omega$     |            |
| R330, 430 | 1-242-681    | 2.2 k $\Omega$     |            |
| R331, 431 | 1-242-663    | 390 $\Omega$       |            |
| R332, 432 | 1-242-713    | 47 k $\Omega$      |            |
| R333, 433 | 1-242-681    | 2.2 k $\Omega$     |            |
| R334, 434 | 1-221-997    | 2.2 k $\Omega$ (B) | semi-fixed |
| R335, 435 | 1-242-667    | 560 $\Omega$       |            |
| R336, 436 | 1-242-629    | 15 $\Omega$        |            |
| R337, 437 | 1-242-721    | 100 k $\Omega$     |            |
| R338, 438 | 1-242-699    | 12 k $\Omega$      |            |
| R339, 439 | 1-242-697    | 10 k $\Omega$      |            |

### SWITCH

|      |           |                     |
|------|-----------|---------------------|
| S102 | 1-514-813 | slide ;   DIRECTION |
|------|-----------|---------------------|

Ref. No.   Part No.   Description

### BIAS OSC CIRCUIT

### SEMICONDUCTORS

|          |            |         |
|----------|------------|---------|
| Q501~506 | transistor | 2SC634A |
|----------|------------|---------|

### COILS & TRANSFORMER

|      |           |                           |
|------|-----------|---------------------------|
| L501 | 1-407-195 | microinductor, 1 mH       |
| L502 | 1-407-195 | microinductor, 1 mH       |
| L503 | 1-407-284 | variable inductor, 1 mH   |
| L504 | 1-407-284 | variable inductor, 1 mH   |
| L505 | 1-407-284 | variable inductor, 1 mH   |
| L506 | 1-407-284 | variable inductor, 1 mH   |
| L507 | 1-407-239 | variable inductor, 3.3 mH |
| L508 | 1-407-239 | variable inductor, 3.3 mH |
| T501 | 1-433-140 | transformer, bias osc     |

### CAPACITORS

|      |              |                |        |               |
|------|--------------|----------------|--------|---------------|
| C501 | 1-121-398    | 10 $\mu$ F     | 25 V   | electrolytic  |
| C502 | 1-105-833-12 | 0.01 $\mu$ F   | 50 V   | mylar         |
| C503 | 1-105-841-12 | 0.047 $\mu$ F  | 50 V   | mylar         |
| C504 | 1-107-252    | 390 pF         | 1000 V | silvered mica |
| C505 | 1-121-404    | 33 $\mu$ F     | 25 V   | electrolytic  |
| C506 | 1-105-825-12 | 0.0022 $\mu$ F | 50 V   | mylar         |
| C507 | 1-105-825-12 | 0.0022 $\mu$ F | 50 V   | mylar         |
| C508 | 1-107-144    | 100 pF         | 1000 V | silvered mica |
| C509 | 1-141-034    | 30~200 pF      |        | trimmer       |
| C510 | 1-141-034    | 30~200 pF      |        | trimmer       |
| C511 | 1-141-034    | 30~200 pF      |        | trimmer       |
| C512 | 1-141-034    | 30~200 pF      |        | trimmer       |
| C513 | 1-141-034    | 30~200 pF      |        | trimmer       |
| C514 | 1-107-018    | 270 pF         | 500 V  | silvered mica |
| C515 | 1-107-018    | 270 pF         | 500 V  | silvered mica |

### RESISTORS

All resistors are  $\frac{1}{4}$  W and carbon type, unless otherwise indicated.

|      |           |                |
|------|-----------|----------------|
| R501 | 1-242-617 | 4.7 $\Omega$   |
| R502 | 1-242-617 | 4.7 $\Omega$   |
| R503 | 1-242-711 | 39 k $\Omega$  |
| R504 | 1-242-625 | 10 $\Omega$    |
| R505 | 1-242-691 | 5.6 k $\Omega$ |
| R506 | 1-242-689 | 4.7 k $\Omega$ |
| R507 | 1-242-721 | 100 k $\Omega$ |
| R508 | 1-242-697 | 10 k $\Omega$  |
| R509 | 1-242-705 | 22 k $\Omega$  |
| R510 | 1-242-715 | 56 k $\Omega$  |
| R511 | 1-242-711 | 39 k $\Omega$  |
| R512 | 1-242-677 | 1.5 k $\Omega$ |

| Ref. No. | Part No. | Description |
|----------|----------|-------------|
|----------|----------|-------------|

|      |           |                |
|------|-----------|----------------|
| R513 | 1-242-705 | 22 k $\Omega$  |
| R514 | 1-242-689 | 4.7 k $\Omega$ |
| R515 | 1-242-651 | 120 $\Omega$   |
| R516 | 1-242-625 | 10 $\Omega$    |
| R517 | 1-242-625 | 10 $\Omega$    |
| R518 | 1-242-625 | 10 $\Omega$    |

**SWITCHES**

|      |           |                             |
|------|-----------|-----------------------------|
| S101 | 1-514-813 | slide; DIRECTION            |
| S102 |           | described in PB AMP CIRCUIT |
| S103 | 1-514-813 | slide; REC                  |
| S104 | 1-514-813 | slide; REC                  |

**POWER SUPPLY CIRCUIT****SEMICONDUCTORS**

|        |            |          |
|--------|------------|----------|
| Q601   | transistor | 2SD291   |
| Q602   | transistor | 2SC634A  |
| Q603   | transistor | 2SC634A  |
| D601-1 | diode      | CD-2     |
| D601-2 | diode      | CD-2     |
| D602   | diode      | 10D-2    |
| D603   | diode      | 10D-05   |
| D608   | diode      | 1T263-40 |
| D609   | diode      | 10D-05   |

**CAPACITORS**

|      |           |              |      |              |
|------|-----------|--------------|------|--------------|
| C601 | 1-121-398 | 10 $\mu$ F   | 25 V | electrolytic |
| C602 | 1-121-388 | 1000 $\mu$ F | 35 V | electrolytic |
| C603 | 1-121-388 | 1000 $\mu$ F | 35 V | electrolytic |
| C610 | 1-121-405 | 33 $\mu$ F   | 50 V | electrolytic |
| C611 | 1-121-404 | 33 $\mu$ F   | 25 V | electrolytic |

**RESISTORS**

All resistors are  $\frac{1}{4}$  W and carbon type, unless otherwise indicated.

|      |           |                   |                 |
|------|-----------|-------------------|-----------------|
| R601 | 1-242-701 | 15 k $\Omega$     |                 |
| R602 | 1-242-697 | 10 k $\Omega$     |                 |
| R603 | 1-221-630 | 20 k $\Omega$ (B) | semi-fixed      |
| R604 | 1-242-697 | 10 k $\Omega$     |                 |
| R605 | 1-242-707 | 27 k $\Omega$     |                 |
| R606 | 1-244-825 | 10 $\Omega$       | $\frac{1}{4}$ W |
| R610 | 1-244-057 | 220 $\Omega$      | $\frac{1}{4}$ W |
| R611 | 1-206-127 | 470 $\Omega$      | 2 W wirewound   |

**MISCELLANEOUS**

|           |           |  |
|-----------|-----------|--|
| CP601~604 | 1-231-057 | encapsulated component C-R<br>0.033 $\mu$ F + 120 $\Omega$ |
|-----------|-----------|--|

| Ref. No. | Part No. | Description |
|----------|----------|-------------|
|----------|----------|-------------|

|       |           |               |
|-------|-----------|---------------|
| RY601 | 1-515-127 | relay, DC24 V |
|-------|-----------|---------------|

**RELAY CIRCUIT****SEMICONDUCTORS**

|       |            |       |
|-------|------------|-------|
| D604  | diode      | 10D-6 |
| D605  | diode      | 10D-2 |
| D606  | diode      | 10D-2 |
| D610  | diode      | 10D-2 |
| Th601 | thermistor |       |

**CAPACITOR**

|      |           |             |      |              |
|------|-----------|-------------|------|--------------|
| C604 | 1-121-810 | 470 $\mu$ F | 50 V | electrolytic |
|------|-----------|-------------|------|--------------|

**RESISTOR**

|      |           |                |                 |        |
|------|-----------|----------------|-----------------|--------|
| R607 | 1-242-725 | 150 k $\Omega$ | $\frac{1}{4}$ W | carbon |
|------|-----------|----------------|-----------------|--------|

**MISCELLANEOUS**

|           |           |  |
|-----------|-----------|--|
| CP605~608 | 1-231-057 | encapsulated component C-R<br>0.033 $\mu$ F + 120 $\Omega$ |
| RY602     | 1-515-127 | relay, DC24 V  |

**MECHANICAL CHASSIS CIRCUIT****SEMICONDUCTORS**

|           |       |       |
|-----------|-------|-------|
| D607, 611 | diode | 10D-6 |
|-----------|-------|-------|

**TRANSFORMER**

|      |           |       |
|------|-----------|-------|
| T601 | 1-441-729 | power |
|------|-----------|-------|

**CAPACITORS**

|      |              |               |       |                                   |
|------|--------------|---------------|-------|-----------------------------------|
| C605 | 1-121-709    | 220 $\mu$ F   | 200 V | electrolytic                      |
| C606 | 1-117-082    | 4 $\mu$ F     | 250 V | metalized paper                   |
| C607 | 1-117-082    | 4 $\mu$ F     | 250 V | metalized paper                   |
| C608 | 1-105-839-12 | 0.033 $\mu$ F | 50 V  | mylar                             |
| C609 | 1-105-839-12 | 0.033 $\mu$ F | 50 V  | mylar                             |
| C610 |              |               |       | described in POWER SUPPLY CIRCUIT |
| C611 |              |               |       | described in POWER SUPPLY CIRCUIT |
| C612 | 1-117-082    | 4 $\mu$ F     | 250 V | metalized paper                   |
| C617 | 1-121-416    | 100 $\mu$ F   | 25 V  | electrolytic                      |

**RESISTORS**

|      |           |              |      |                        |
|------|-----------|--------------|------|------------------------|
| R608 | 1-227-092 | 1 k $\Omega$ | 10 W | wirewound (semi-fixed) |
|------|-----------|--------------|------|------------------------|

| Ref. No. | Part No.  | Description                              | Ref. No. | Part No. | Description |
|----------|-----------|--|----------|----------|-------------|
| R609     | 1-227-134 | 150 $\Omega$ 15 W wirewound (semi-fixed) |          |          | ESP CIRCUIT |
| R618     | 1-242-639 | 39 $\Omega$ $\frac{1}{2}$ W carbon       |          |          |             |

**SWITCHES**

|      |           |                              |
|------|-----------|------------------------------|
| S601 | 1-514-864 | micro; FWD-REV (1)           |
| S602 | 1-514-864 | micro; PLAY, FF-STOP (1)     |
| S603 | 1-514-866 | lever; POWER                 |
| S604 | 1-514-864 | micro; PLAY-FF, STOP (1)     |
| S605 | 1-514-864 | micro; PLAY, FF-STOP (2)     |
| S606 | 1-514-865 | micro; STOP                  |
| S607 | 1-514-865 | micro; FF (1)                |
| S608 | 1-514-865 | micro; PLAY (1)              |
| S609 | 1-514-864 | micro; AUTO SHUT-OFF (1)     |
| S610 | 1-514-864 | micro; PLAY, FF-STOP (3)     |
| S611 | 1-514-864 | micro; FF (2)                |
| S612 | 1-514-864 | micro; PLAY-FF, STOP (3)     |
| S613 | 1-514-706 | leaf; PLAY-FF, STOP (3)      |
| S614 | 1-514-864 | micro; PLAY, FF-STOP (4)     |
| S615 | 1-514-699 | leaf; PLAY (2)               |
| S616 | 1-514-699 | leaf; PLAY (3)               |
| S617 | 1-514-633 | lever; CONT. REV/REV/REV OFF |
| S618 | 1-514-864 | micro; AUTO SHUT-OFF (2)     |
| S619 | 1-514-864 | micro; FWD-REV (2)           |
| S620 | 1-514-707 | leaf; PLAY-FF, STOP (4)      |

**MISCELLANEOUS**

|            |              |  |
|------------|--------------|--|
| CP609-613  | 1-231-057    | encapsulated component C-R<br>0.033 $\mu$ F + 120 $\Omega$ |
| CP614-617  | 1-101-534    | encapsulated component C-R<br>0.1 $\mu$ F + 120 $\Omega$   |
| CP618-621  | 1-231-057    | encapsulated component C-R<br>0.033 $\mu$ F + 120 $\Omega$ |
| CP622, 623 | 1-101-534    | encapsulated component C-R<br>0.1 $\mu$ F + 120 $\Omega$   |
| PM601      | 1-454-075    | plunger solenoid   |
| PM602, 603 | 1-454-074    | plunger solenoid   |
| CN601      | 1-509-341    | AC OUTLET  |
| VS601      | 1-509-427    | socket, power voltage selector                             |
| F1         | 1-532-100    | fuse, 2A   |
|            | 1-533-048    | holder, fuse   |
|            | 1-534-487    | cord, power  |
|            | 1-535-045    | terminal, contact; printed circuit board                   |
|            | 1-535-046    | receptacle   |
|            | 1-536-029    | terminal, 4P mold  |
|            | 1-536-181    | terminal strip 2L1   |
|            | 1-536-183    | terminal strip 2L3   |
| M1         | 8-836-214-01 | motor, capstan (UC-214G)                                   |
| M2, 3      | 8-836-624-07 | motor, reel (UC-624K)                                      |

**SEMICONDUCTORS**

|          |            |         |
|----------|------------|---------|
| Q701     | transistor | 2SC632A |
| Q702-713 | transistor | 2SC634A |
| D701     | diode      | 10D-05  |
| D702     | diode      | 10D-05  |
| D703     | diode      | 1T-22   |
| D704     | diode      | 10D-05  |
| D705     | diode      | 1T-22   |
| D706     | diode      | 10D-05  |
| D707     | diode      | 10D-05  |
| D708     | diode      | 10D-05  |
| D709     | diode      | 1T-22   |

**CAPACITORS**

|      |              |                    |               |
|------|--------------|--------------------|---------------|
| C701 | 1-105-673-12 | 0.01 $\mu$ F 50 V  | mylar         |
| C702 | 1-105-679-12 | 0.033 $\mu$ F 50 V | mylar         |
| C703 | 1-105-661-12 | 0.001 $\mu$ F 50 V | mylar         |
| C704 | 1-121-398    | 10 $\mu$ F 25 V    | electrolytic  |
| C705 | 1-121-391    | 1 $\mu$ F 50 V     | electrolytic  |
| C706 | 1-107-139    | 220 pF 50 V        | silvered mica |
| C707 | 1-121-398    | 10 $\mu$ F 25 V    | electrolytic  |
| C708 | 1-121-391    | 1 $\mu$ F 50 V     | electrolytic  |
| C709 | 1-121-403    | 33 $\mu$ F 16 V    | electrolytic  |
| C710 | 1-121-416    | 100 $\mu$ F 25 V   | electrolytic  |
| C711 | 1-121-391    | 1 $\mu$ F 50 V     | electrolytic  |
| C712 | 1-121-391    | 1 $\mu$ F 50 V     | electrolytic  |
| C713 | 1-105-673-12 | 0.01 $\mu$ F 50 V  | mylar         |
| C714 | 1-105-676-12 | 0.018 $\mu$ F 50 V | mylar         |

**RESISTORS**

All resistors are  $\frac{1}{2}$  W and carbon type, unless otherwise indicated.

|      |              |                  |            |
|------|--------------|------------------|------------|
| R701 | 1-242-713    | 47 k $\Omega$    |            |
| R702 | 1-242-681    | 2.2 k $\Omega$   |            |
| R703 | 1-242-707    | 27 k $\Omega$    |            |
| R704 | 1-242-723-09 | 120 k $\Omega$   | low noise  |
| R705 | 1-242-723-09 | 120 k $\Omega$   | low noise  |
| R706 | 1-242-705-09 | 22 k $\Omega$    | low noise  |
| R707 | 1-242-689    | 4.7 k $\Omega$   |            |
| R708 | 1-242-727-09 | 180 k $\Omega$   | low noise  |
| R709 | 1-242-707-09 | 27 k $\Omega$    | low noise  |
| R710 | 1-242-737-09 | 470 k $\Omega$   | low noise  |
| R711 | 1-221-663    | 2 k $\Omega$ (B) | semi-fixed |
| R712 | 1-242-697    | 10 k $\Omega$    |            |
| R713 | 1-242-675    | 1.2 k $\Omega$   |            |
| R714 | 1-242-709    | 33 k $\Omega$    |            |
| R715 | 1-242-737    | 470 k $\Omega$   |            |



| <u>Ref. No.</u> | <u>Part No.</u> | <u>Description</u>            |
|-----------------|-----------------|-------------------------------|
| R716            | 1-242-691       | 5.6 k $\Omega$                |
| R717            | 1-221-664       | 100 k $\Omega$ (B) semi-fixed |
| R718            | 1-242-705       | 22 k $\Omega$                 |
| R719            | 1-242-713       | 47 k $\Omega$                 |
| R720            | 1-242-745       | 1 M $\Omega$                  |
| R721            | 1-242-721       | 100 k $\Omega$                |
| R722            | 1-242-713       | 47 k $\Omega$                 |
| R723            | 1-242-705       | 22 k $\Omega$                 |
| R724            | 1-242-707       | 27 k $\Omega$                 |
| R725            | 1-242-701       | 15 k $\Omega$                 |
| R726            | 1-242-685       | 3.3 k $\Omega$                |
| R727            | 1-242-717       | 68 k $\Omega$                 |
| R728            | 1-242-737       | 470 k $\Omega$                |
| R729            | 1-242-633       | 22 $\Omega$                   |
| R730            | 1-242-673       | 1 k $\Omega$                  |
| R731            | 1-242-705       | 22 k $\Omega$                 |
| R732            | 1-242-713       | 47 k $\Omega$                 |
| R733            | 1-242-745       | 1 M $\Omega$                  |
| R734            | 1-242-713       | 47 k $\Omega$                 |
| R735            | 1-242-705       | 22 k $\Omega$                 |
| R736            | 1-242-707       | 27 k $\Omega$                 |
| R737            | 1-242-701       | 15 k $\Omega$                 |
| R738            | 1-242-699       | 12 k $\Omega$                 |
| R739            | 1-242-721       | 100 k $\Omega$                |
| R740            | 1-242-633       | 22 $\Omega$                   |
| R741            | 1-242-689       | 4.7 k $\Omega$                |
| R742            | 1-242-705       | 22 k $\Omega$                 |
| R743            | 1-242-721       | 100 k $\Omega$                |
| R744            | 1-242-673       | 1 k $\Omega$                  |
| R745            | 1-242-705       | 22 k $\Omega$                 |

## SERVO CONTROL CIRCUIT

## SEMICONDUCTORS

|                   |                           |        |
|-------------------|---------------------------|--------|
| Q901              | transistor                | 2SC867 |
| D901              | diode                     | 10D-2  |
| D902 <sup>1</sup> | diode                     | CD-2   |
| D903 <sup>2</sup> | diode                     | CDR-2  |
| IC901             | integrated circuit CX-032 |        |

| <u>Ref. No.</u>   | <u>Part No.</u> | <u>Description</u>                  |
|-------------------|-----------------|-------------------------------------|
| <b>CAPACITORS</b> |                 |                                     |
| C901              | 1-105-843-12    | 0.068 $\mu$ F 50 V mylar            |
| C902              | 1-108-551-11    | 0.15 $\mu$ F 50 V mylar             |
| C903              | 1-105-821-12    | 0.001 $\mu$ F 50 V mylar            |
| C904              | 1-121-398       | 10 $\mu$ F 25 V electrolytic        |
| C905              | 1-121-398       | 10 $\mu$ F 25 V electrolytic        |
| C906              | 1-121-416       | 100 $\mu$ F 25 V electrolytic       |
| C907              | 1-121-403       | 33 $\mu$ F 16 V electrolytic        |
| C908              | 1-121-409       | 47 $\mu$ F 16 V electrolytic        |
| C909              | 1-127-306       | 6.8 $\mu$ F 16 V electrolytic, alox |
| C910              | 1-105-835-12    | 0.015 $\mu$ F 50 V mylar            |
| C911              | 1-121-818       | 10 $\mu$ F 160 V electrolytic       |

## RESISTORS

All resistors are 1/4 W and carbon type, unless otherwise indicated.

|      |           |                   |            |
|------|-----------|-------------------|------------|
| R901 | 1-221-401 | 10 k $\Omega$ (B) | semi-fixed |
| R902 | 1-242-709 | 33 k $\Omega$     |            |
| R903 | 1-221-952 | 20 k $\Omega$ (B) | semi-fixed |
| R904 | 1-242-717 | 68 k $\Omega$     |            |
| R905 | 1-221-953 | 50 k $\Omega$ (B) | semi-fixed |
| R906 | 1-242-724 | 130 k $\Omega$    |            |
| R907 | 1-242-691 | 5.6 k $\Omega$    |            |
| R908 | 1-242-680 | 2 k $\Omega$      |            |
| R909 | 1-242-689 | 4.7 k $\Omega$    |            |
| R910 | 1-242-639 | 39 $\Omega$       |            |
| R911 | 1-244-867 | 560 $\Omega$      | 1/2 W      |
| R912 | 1-242-697 | 10 k $\Omega$     |            |
| R913 | 1-242-691 | 5.6 k $\Omega$    |            |
| R914 | 1-242-683 | 2.7 k $\Omega$    |            |
| R915 | 1-242-677 | 1.5 k $\Omega$    |            |
| R916 | 1-242-702 | 16 k $\Omega$     |            |
| R917 | 1-242-689 | 4.7 k $\Omega$    |            |
| R918 | 1-242-657 | 220 $\Omega$      |            |
| R919 | 1-242-705 | 22 k $\Omega$     |            |

## SWITCH

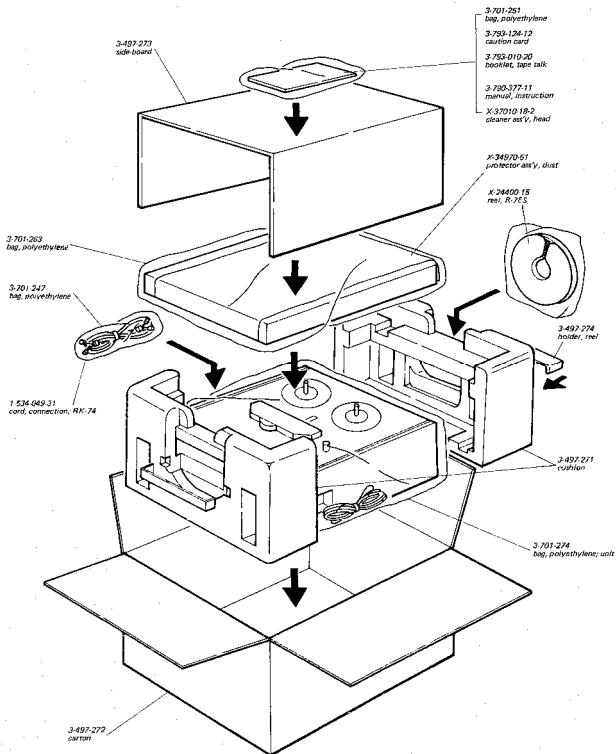
|      |           |                   |
|------|-----------|-------------------|
| S901 | 1-514-323 | slide; TAPE SPEED |
|------|-----------|-------------------|

When ordering replacement parts you should use **PART NUMBER** listed on the Parts List or shown in the Exploded View. The reference number should not be used for ordering purposes.

## SECTION 6

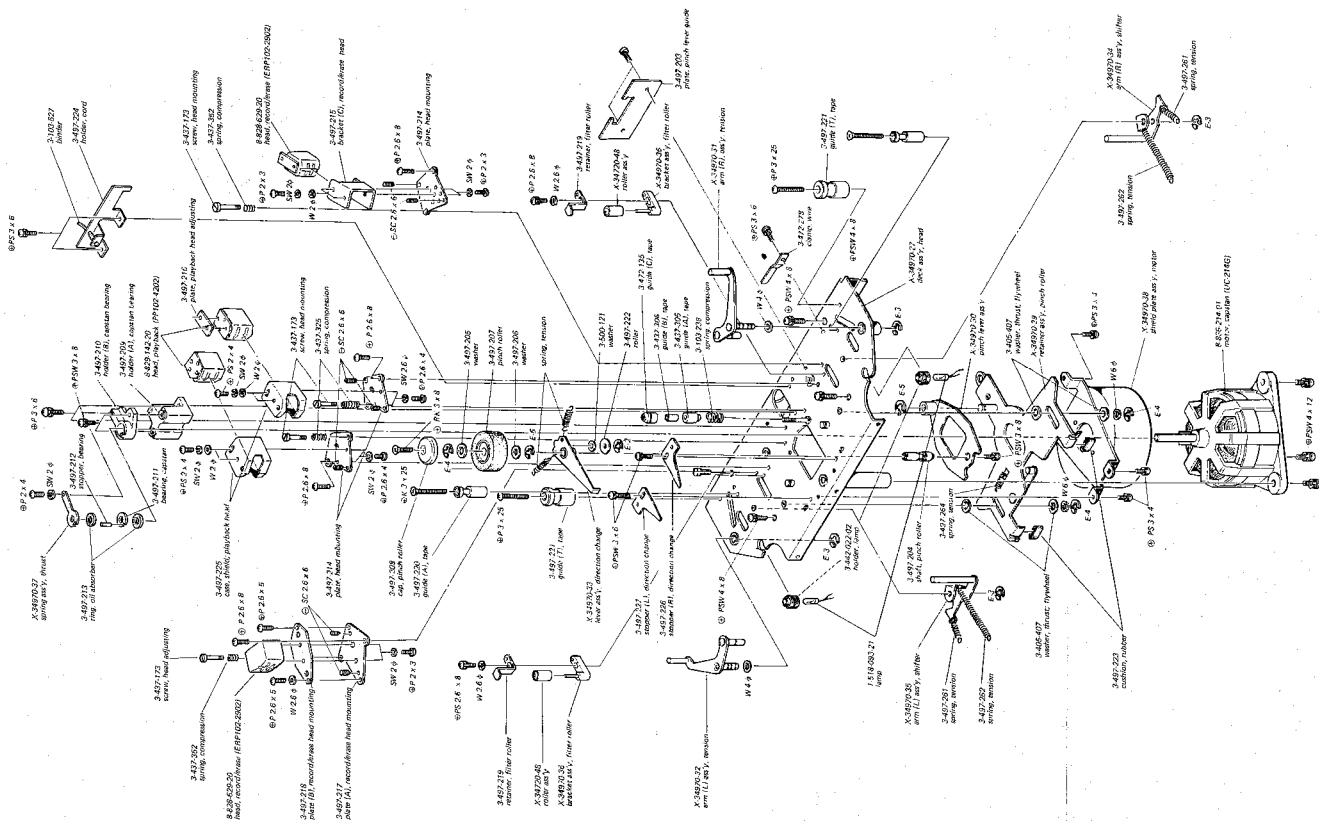
### EXPLODED VIEWS

#### 6-1. PACKING

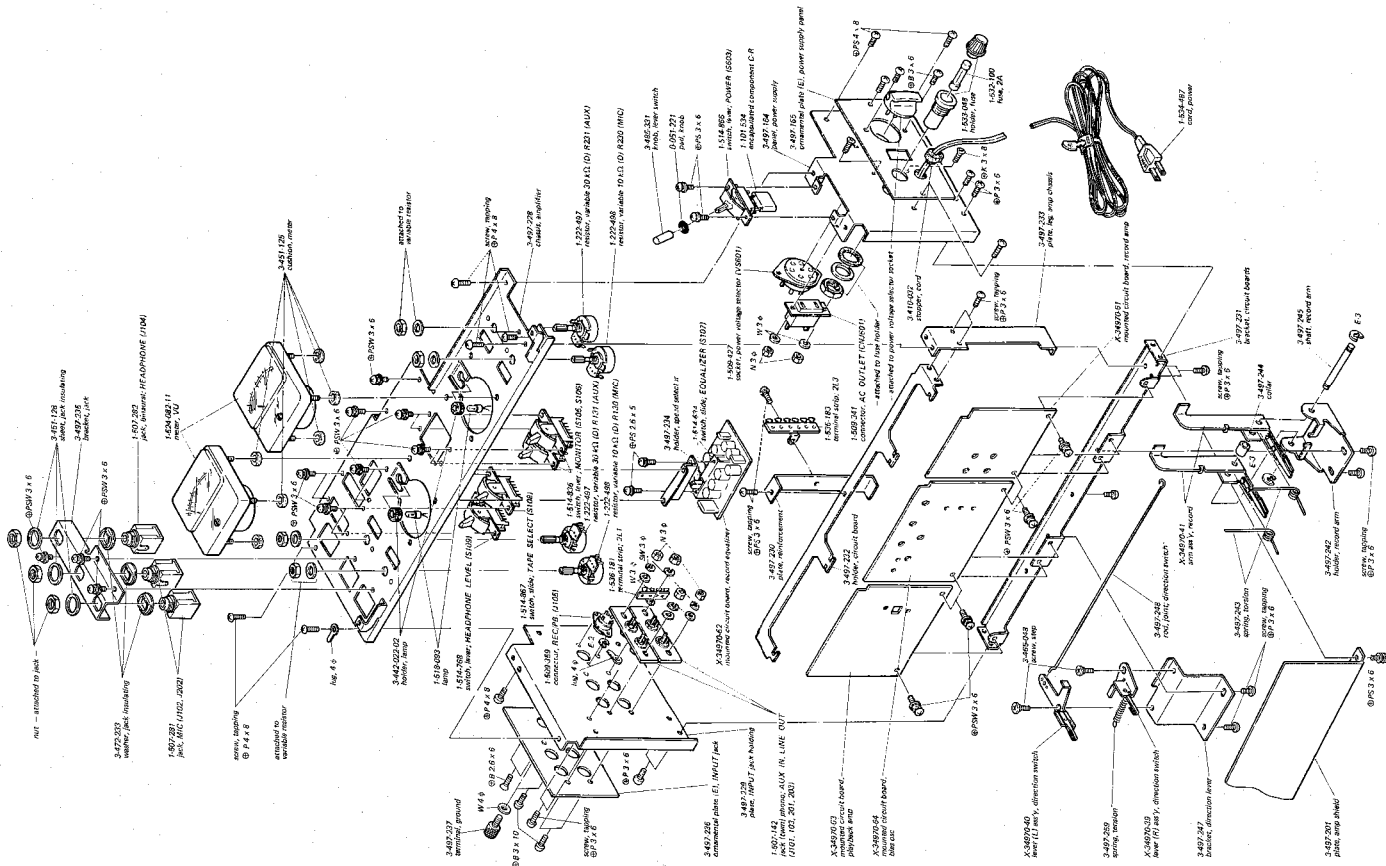




### 6-3. HEAD DECK – TOP VIEW –

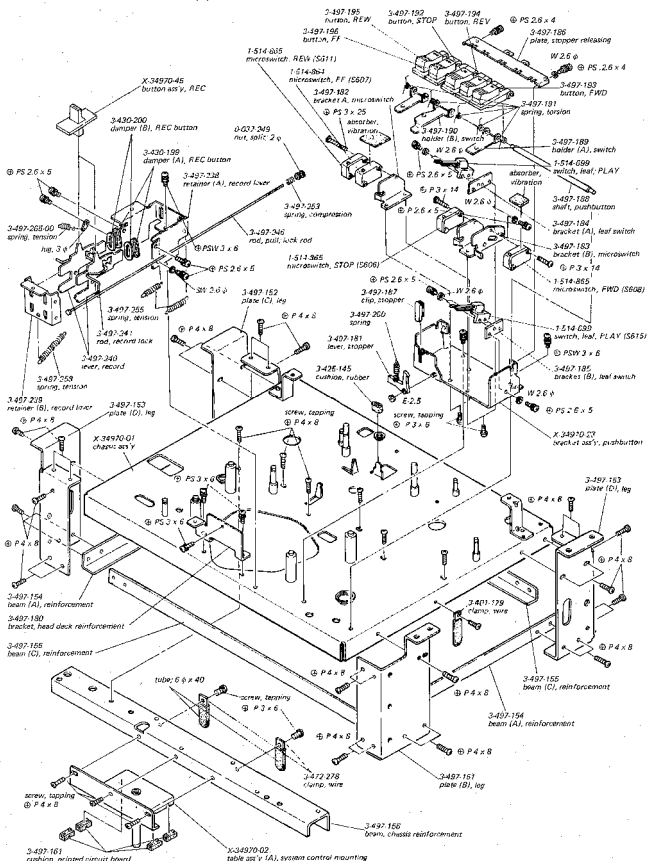


#### 6-4. AMPLIFIER CHASSIS – TOP VIEW –

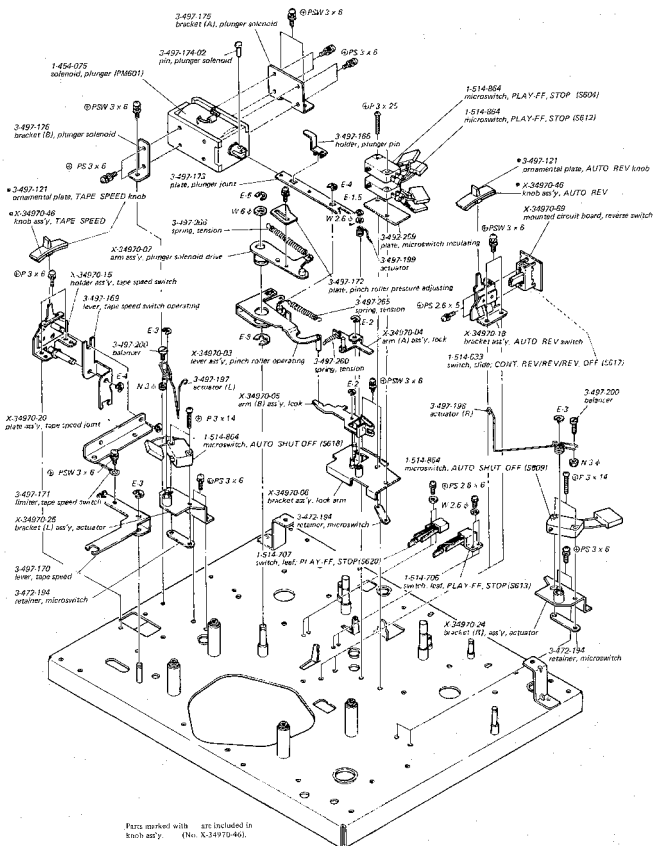




### 6-6. CHASSIS - TOP VIEW - (2)



6-7. CHASSIS - TOP VIEW - (3)



Parts marked with  are included in knob ass'y. (Nc. X-34970-46).





# TC-580

No. 1  
OCT. 1971

## SUPPLEMENT

SUBJECT : CIRCUIT DESCRIPTION



**SONY®**  
**SERVICE MANUAL**

**CIRCUIT DESCRIPTION**

The following describes operation of main circuit:

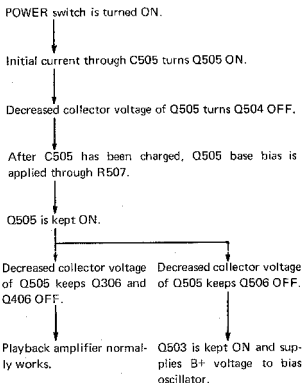
**1. RECORD AMP CIRCUIT**

First stage of the record amplifier comprises NPN and PNP type transistors connected in parallel. This circuit improves linearity characteristics of record amplifier for MIC jack input signals. Approximately 50 dB linearity can be obtained. Therefore, can record signals with greater input level (approximately -10 dB, 0.25 V to MIC jack) with low distortion. Linearity for conventional circuit which has only one transistor is approximately 30 dB.

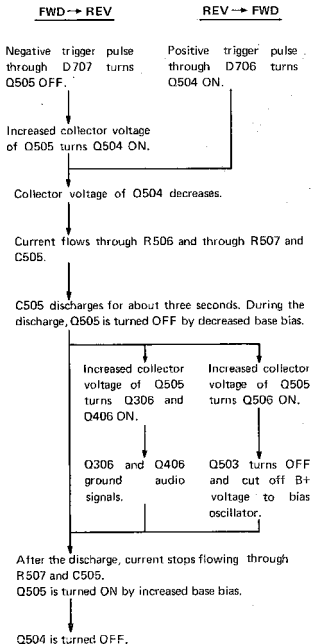
**2. MUTING CIRCUIT**

During direction change of tape transport (about three seconds), from the time when tape stops moving until tape motion reverses and recovers to normal tape speed, B+ voltage of bias oscillator is cut off in record mode and the muting circuits (Q306 and Q406) of playback amplifier are activated in playback mode.

When turning **POWER** switch ON, the multivibrator (Q504 and Q505) is kept stable as follows:



When changing the unit from FWD mode to REV mode or vice versa, this circuit acts as follows:



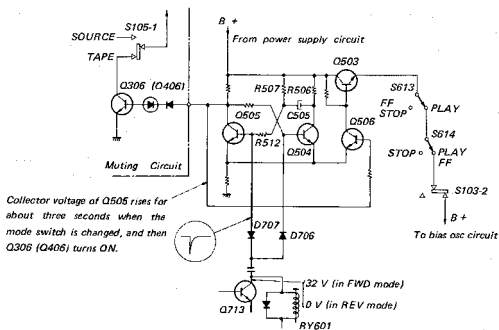


Fig. 1. Muting circuit

### 3. SYSTEM CONTROL

#### 3-1. Tape transport direction changing operation

When REV pushbutton is pushed, S616 turns ON and then Q708 turns ON. Since Q713 is already kept activated, current flows through direction relay RY601 (REV relay) and RY601 is energized. Then contacts of RY601 short-circuit Q708. Therefore

RY601 is kept energized in REV mode. Direction change solenoid PM603 is energized by contacts of RY601. Initial energizing voltage for RM603 is 170 volts dc and then the voltage is changed to 30 volts dc by S601 which RM603 actuates. When FWD pushbutton is pushed in REV playback mode, S615 turns ON. Q713 turns OFF and cuts current flow into RY601. Also tape transport direction can be changed by controlling voltage applied at point "a" and "b" in Fig. 2 from ESP circuit.

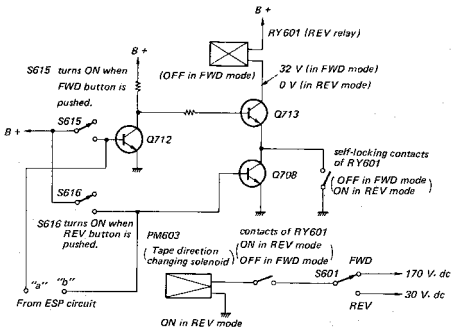


Fig. 2. System control circuit

### 3-2. Brake solenoid PM602

When FWD button is pushed, S608 turns ON. Then high voltage (about 170 volts dc) rectified by D604 is applied to PM602 through S605. PM602 is energized.

### 3-3. Reel motor circuit

The motor current flows as follows:

46 V or 80 V terminals of power transformer  
 → S612 → R609 → contacts  
 of relay RY602 → reel motors M2, M3  
 → S610 → 0 V terminal of power  
 transformer

### 3-4. Pinch roller solenoid PM601

When S602 is turned ON by solenoid PM602, high voltage (about 170 volts dc) rectified by D604 is applied to PM601 through S604. PM601 is energized.

### 3-5. Solenoid operating voltage

Solenoids (for brake, pinch roller, and tape direction) are energized by high voltage (about 170 volts dc) and kept energized by low voltage (about 30 volts dc).

### 3-6. S612

This switch supplies a high reel-motor-driving voltage (80 volts ac) to make strong tape tension in a starting moment, because of tape slack elimination. When pressing FWD or REV button, S612 supplies 80 volts ac for about one second until pinch roller solenoid PM601 actuates S612. After solenoid PM601 has actuated S612, S613 supplies 46 volts ac for normal tape tension.

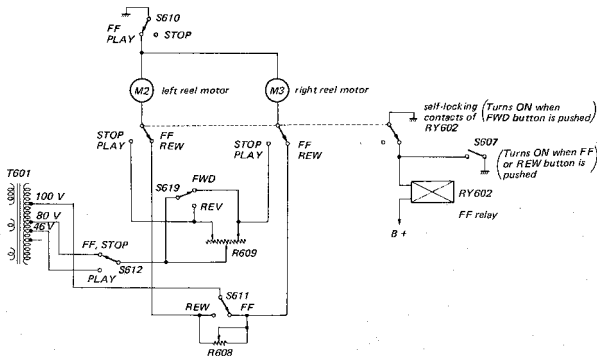


Fig. 3. Reel motor circuit

#### 4. ESP (ELECTRIC SENSORY PERCEPTOR) CIRCUIT

Model TC-580 employs ESP circuit to reverse automatically tape travel direction in approximately eight seconds after signals from tape tracks 3 and 4 are over during playback operation. ESP circuit detects both signals from R-CH LINE OUT and R-CH

head terminal of reverse track. If ESP circuit operates by signal only from LINE OUT, you may not enjoy a music from the beginning after ESP automatic reverse operation.

- 4-1. When no signal recorded part of tape beginning is played in forward playback mode:

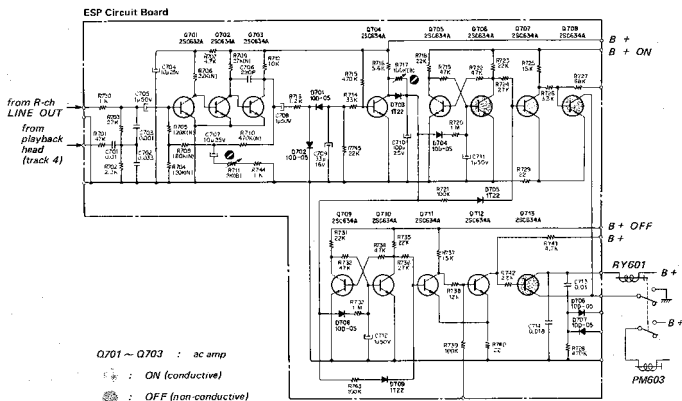


Fig. 4. ESP circuit (1)

RY601 DIRECTION relay : de-energized

PM603 DIRECTION CHANGE solenoid : de-energized

DC positive bias applied through R715 holds Q704 ON in no signal input.

- 4-2. When signal recorded part of tape is played in forward playback mode:

ESP Circuit Board

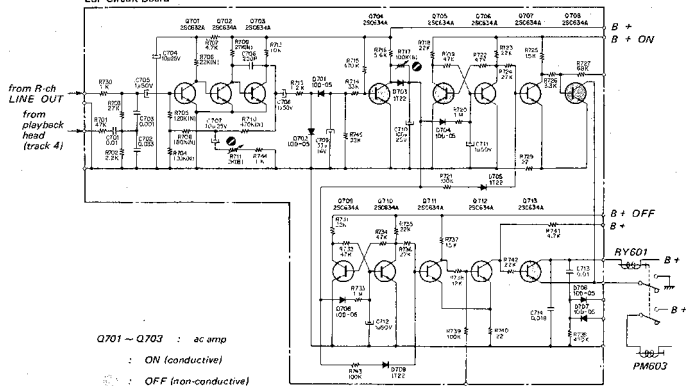


Fig. 5. ESP circuit (2)

RY601 DIRECTION relay: de-energized  
PM603 DIRECTION CHANGE solenoid: de-energized

Input signal turns Q704 OFF. Q704 collector  
voltage turns Q706 ON and holds Q707 ON.

## 4-3. When signal recorded part of tape is over:

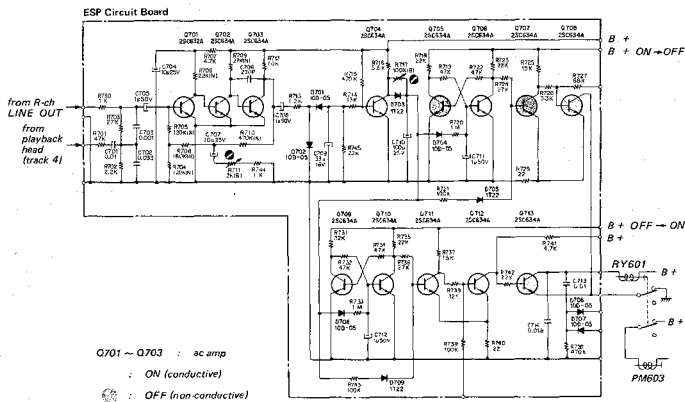


Fig. 6. ESP circuit (3)

RY601 DIRECTION relay: energized

PM603 DIRECTION CHANGE solenoid: energized

No-signal input turns Q704 ON. C710 discharges through R717 and Q704 for about six seconds. After that, Q707 turns OFF. The contacts of energized RY601 energize PM603 and cut off B + voltage for transistors Q705 through Q707. One of the RY601-contacts, however, turns Q713 ON and holds itself (RY601) energized.

## 4-4. After tape transport direction has been changed:

The contacts of energized RY601 cut off B + voltage for transistors Q705 through Q707, and supply B + voltage for transistors Q709 through Q711. In the reverse playback mode, Q709 through Q711 act in the same way as Q705 through Q707.



## 5. AC SERVO CIRCUIT

The Model TC-580 employs ac servo amplifier circuit and keeps tape speed constant.

### 5-1. Principle

See block diagram in Fig. 7. Motor speed determined by voltage  $E_m$  can be changed by voltage  $E_r$ .

$$E(\text{fixed}) = E_m + E_r$$

When motor speed becomes faster or slower than intended speed according to external disturbances, the intended motor speed can be obtained again by changing voltage  $E_r$ , or by changing resistance  $R$ . The frequency generator FG in the motor detects motor speed deviation. Servo amplifier changes resistance  $R$  according to the deviation. TC-580 uses impedance  $R$  between collector and emitter of transistor Q901 instead of resistance  $R$  as shown in Fig. 8. Impedance  $R$  can be changed by the base voltage. The motor speed can be kept stable by controlling the base voltage for the motor speed deviation. The bridge type rectifier comprising four diodes makes current flow through transistor Q901 in the direction shown by the arrow in Fig. 8.

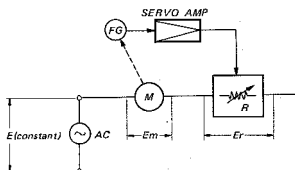


Fig. 7. Servo control system block diagram

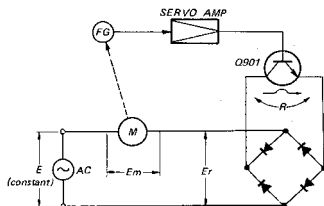


Fig. 8. Q901 instead of resistance R

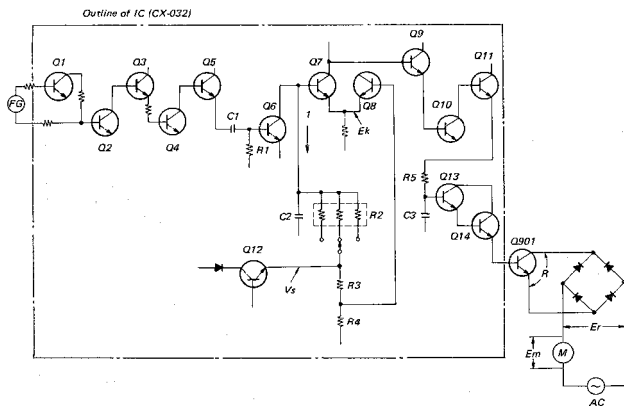


Fig. 9. Servo amplifier outline

## 5-2. Servo amplifier operation

Servo amplifier which changes impedance  $R$  operates as follows: See Fig. 9 and Fig. 10.

- 1) Sine wave signal generated by frequency generator FG is transferred to bases of Q1 and Q2. Since base bias voltages of Q1 and Q2 are set to saturation region, sine wave signal is waveshaped to square wave signal shown by (A) in Fig. 10.
- 2) Square wave signal from Q2 is amplified by Q3, Q4 and Q5. It is transferred to differentiating circuit comprising C1 and R1 and is waveshaped to pulse shown by (B) in Fig. 10. Then it is transferred to base of Q6.
- 3) Dc voltage  $V_s$  stabilized by Q12 is divided by R3 and R4. Then it is transferred to base of Q8 and keeps the emitter voltage  $E_k$  of Q8 (also that of Q7) constant.
- 4)  $V_s$  also charges C2 according to the time constant decided by C2 and R2. The charged voltage is applied to collector of Q6. When pulse shown by (B) in Fig. 10 is transferred to base of Q6, Q6 repeats ON and OFF states. C2 discharges while Q6 makes current flow as shown by the arrow (1) in Fig. 9. Thus sawtooth wave signal shown by (C) in Fig. 10 is obtained at collector of Q6.

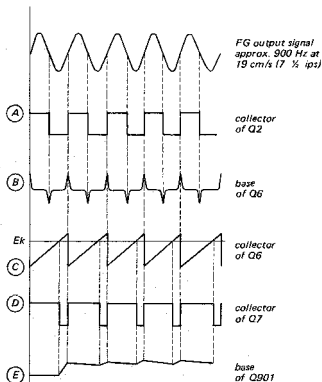


Fig. 10. Waveform at each point

- 5) The sawtooth wave signal is supplied to base of Q7. Since the emitter voltage  $E_k$  is kept constant, Q7 turns ON only when the peak value of sawtooth wave signal is greater than  $E_k$ . When Q7 turns ON, the negative pulse shown by (D) in Fig. 10, appears at collector of Q7.
- 6) This pulse is amplified by Q9, Q10 and Q11, and its polarity is inverted. The positive pulse is transferred to the integrator comprising R5 and C3, and is waveshaped as shown by (E) in Fig. 10. After being amplified by Q13 and Q14, it is transferred to base of Q901. And this base voltage changes impedance between collector and emitter of Q901 and controls motor speed.

## 5-3. Motor speed deviation from intended value

- 1) When motor speed becomes faster (Fig. 11);

Switching speed of Q6 becomes faster since frequency of frequency generator FG increases. Collector voltage of Q6 is grounded before it becomes greater than emitter voltage  $E_k$  (constant) because of short charging time for C2. The peak value of the sawtooth wave signal at base of Q7 is less than  $E_k$ . Thus Q7 turns OFF, and base voltage of Q901 decreases since the pulse is not supplied to base of Q9. When impedance  $R$  becomes greater, motor voltage  $E_m$  decreases and motor speed decreases to the intended.

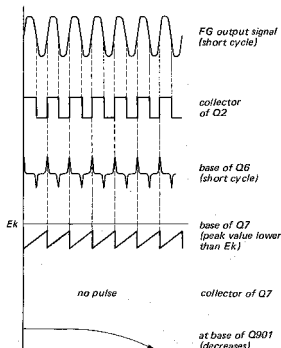


Fig. 11. When motor speed becomes faster

- 2) When motor speed becomes slower (Fig. 12);

Switching speed of Q6 becomes slower since frequency of frequency generator FG decreases. Collector voltage of Q6 is grounded after it becomes greater than emitter voltage of Q7 because of sufficient charging time for C2. The peak value of the sawtooth wave signal at base of Q7 is higher than  $E_k$ . Thus Q7 turns ON for T seconds, and base voltage of Q901 increases since the pulse is supplied to base of Q9, when impedance R becomes less. motor voltage  $E_m$  increases and motor speed increases to the intended speed. Thus by changing the time T motor speed is controlled.

Time T is determined by charging-time of C2 (the inclination of the sawtooth wave). In this ac servo circuit, the time constant ( $C2 \times R2$ ) for charging time is determined by R2 for the specified tape speed.

- 3) Circuit operation when motor starts running;

Just after the power switch is turned ON, Q6 is still turned OFF since signal is not supplied from the frequency generator (motor is not running). C2 is charged rapidly, and greater voltage than  $E_k$  is applied to base of Q7. When base voltage of Q901 increases, ac voltage is applied to the motor and the motor starts running rapidly. In the FF mode, the servo circuit does not work and ac voltage is applied to the motor directly.

Then motor rotates at full speed.

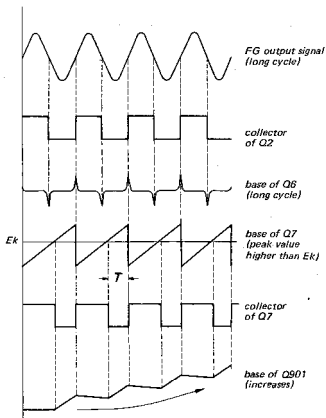
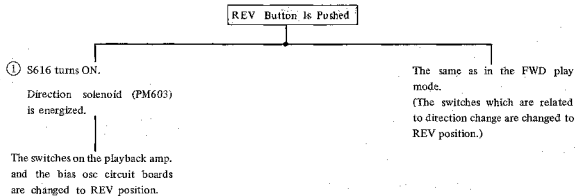
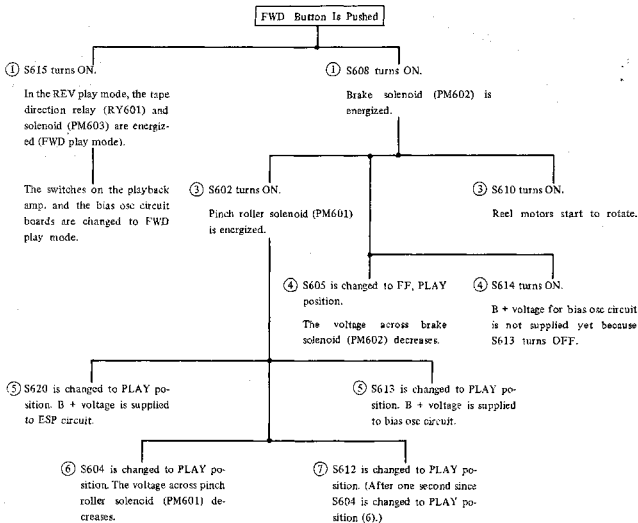
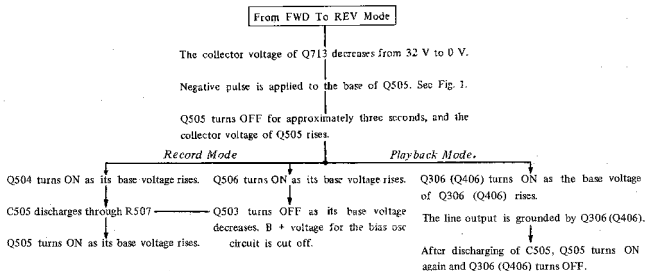
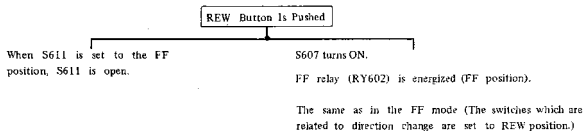
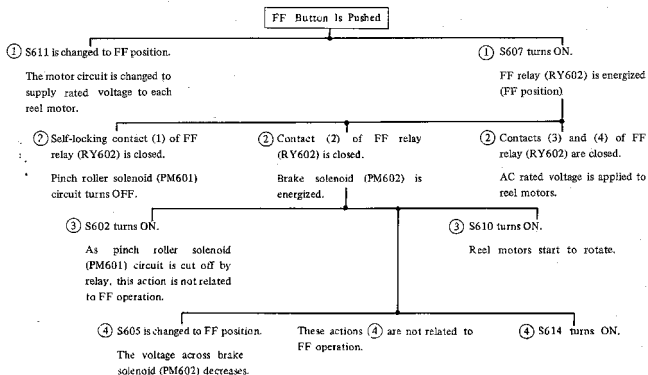


Fig. 12. When motor speed becomes slower

## SEQUENCE OF SWITCH OPERATION

Note: The number in circle shows the sequence of switch operation when the mode is changed.





SONY CORPORATION

## SUPPLEMENT

No. 2  
NOVEMBER, 1971

**SUBJECT: MINOR CHANGE OF FUNCTION SELECTOR MECHANISM**  
**APPLICABLE SERIAL NO.:** 13961 and later (General Export)  
13001 and later (USA)

### 1. DESCRIPTION

Leaf switches S615 and S616 were changed and accordingly the function selector assembly was changed as per Fig. 1 on Page 2.

#### Parts Omitted:

| <u>Part No.</u> | <u>Description</u>        |        |
|-----------------|---------------------------|--------|
| 3-497-184-      | bracket (A), leaf switch  |        |
| 3-497-185-      | bracket (B), leaf switch  |        |
| 1-514-699-      | switch, leaf (S615, S616) | 2 pcs. |

#### Parts Added:

| <u>Part No.</u> | <u>Description</u>    |        |
|-----------------|-----------------------|--------|
| 3-472-194-      | retainer, microswitch |        |
| 3-497-287-      | cushion, button       | 2 pcs. |
| 1-514-423-      | microswitch           | 2 pcs. |

### 2. ADJUSTMENT

No adjustment is required. Therefore, 3-1-21 PLAY Switch (S615, S616) Position Adjustment on Page 16 of TC-580 SERVICE MANUAL is not required for the set having Serial No. 13001, 13961 and later.

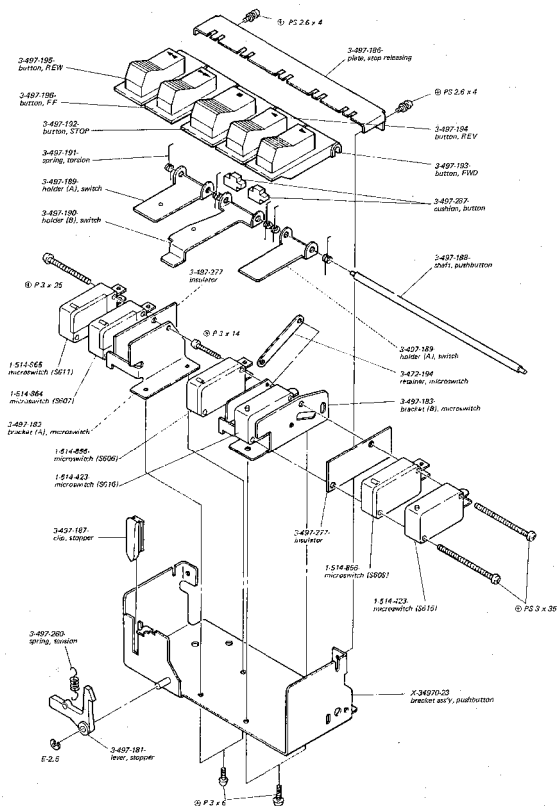


Fig. 1 Function selector

SONY CORPORATION